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FIRST BOOK

IN

ARITHMETIC,

INCLUDING

ORAL AND WRITTEN EXERCISES.

By DANIEL W. FISH, A.M.,

EDITOR OF ROBINSON'S SERIES OF PROGRESSIVE ARITHMETICS.

IVISON, BLAKEMAN, TAYLOR & CO.,
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PREFACE

ARITHMETIC has been defined as "the science of numbers, and the art of computing by means of them." It embraces,

1st. The mode of representing numbers by figures and signs, in accordance with an accepted system;

2d. The principles and methods of their combination in addition, subtraction, multiplication, and division; and,

3d. The application of these principles and methods to the solution of practical problems.

Primary Arithmetic can do little more than put the pupil in possession of the *alphabet* of numbers, and make him familiar with the various tables, securing readiness and accuracy in their use, and neatness and skill in written exercises upon them.

In this book, the object has been to secure this end by easy, gradual, and rational steps, and in such a familiar manner, as to avoid the drudgery of memorizing the abstract tables, and at the same time inspire intelligent thought in regard to the more simple processes that involve the use of numbers.

The plan of this book is *unique*, and it is believed that it will supply a want long felt by primary-school teachers. The natural and orderly *development of the subject*, the systematic *arrangement*, the copious *illustrative exercises*, and the provision for exhaustive *drill exercises*, cannot fail to meet the views of the most thorough and exacting teacher, and, at the same time, interest and attract the pupil.

The first seventeen lessons are intended to present the numbers from *one* to *ten*, inclusive, *as numbers*, in such manner that each of them shall be intelligently apprehended, not merely as a name, but as an IDEA—what it is, how it is represented, and what is its value relative to each of the others.

Succeeding this are familiar illustrations of the *use of signs;* and a series of easy and progressive exercises present the various combinations that can be made by means of any two of all the numbers under 12—giving practical drill exercises on the tables, and illustrating their use by means of problems.

A new form of table, "*equal parts of numbers,*" has been introduced and practically applied, consistent with primary operations upon whole numbers, naturally deduced from the multiplication table as is the ordinary table of division. The practical value of this will be apparent from the problems and examples given in illustration, and the drill exercises in connection with it.

The exercises in notation and numeration are simple and progressive, and may be further extended, at the option of the teacher.

The latter part of the book makes a more thorough, but still progressive and systematic, presentation of principles and methods in the fundamental rules, oral and written.

The simple exercises here presented in Fractions and Measures (Denominate Tables) will furnish opportunity for more extended exercises, such as the judicious teacher may desire, or the requirements of particular classes may demand.

The *Pictorial Illustrations*, designed more for use than ornament, will commend themselves to the taste and judgment of discriminating teachers.

In the preparation of this book, the author has kept constantly in view such a systematic arrangement and development of principles and methods as to present the subject in the most natural as well as the most comprehensive manner.

The author desires to make special acknowledgment of the valuable services rendered in the plan, arrangement, and compilation of this book, by James Cruikshank, LL.D., a gentleman well known to the educational world, whose large experience for a number of years as Superintendent of the Primary Schools of the city of Brooklyn has made him familiar with the needs of teachers of this grade of schools.

With a desire to contribute to the facilities for elementary instruction, this little work is confidently submitted to the public.

D. W. F.

BROOKLYN, *April*, 1875.

HINTS TO TEACHERS

THE division of this book into *lessons* is not at all intended to mark out the limit of the *daily exercises*. Each lesson discusses a separate topic, and many of them furnish or suggest matter upon which several days may be profitably spent; some present drill exercises that may be frequently repeated with profit, the class returning to them from more advanced periods. Practically, the exercises embraced in this book cover three years or more of the primary school course as prescribed in most of our *city* schools.

Advance *slowly;* one step at a time, and always secure a perfect mastery of any principle or operation upon which another depends, before proceeding to the next.

Go over only so much ground at any one exercise as may be thoroughly understood, and *review* daily.

The greatest source of embarrassment to the teacher, and of disgust and waning interest on the part of the pupil, is found in the accumulation of imperfectly mastered lessons.

Endeavor to secure the interest of the class, and never do for a pupil what he can be readily led to do for himself. *Slate exercises* are important *from the first*, and if judiciously conducted will never fail to please and instruct.

The various combinations by addition, subtraction, multiplication, and division, presented in the tables, furnish the instruments for all arithmetical operations. If the pupil is skillful in these, the only other thing needful is such a familiar knowledge of the *relation of things* as to know what process should be used in the solution of problems.

In the early lessons in arithmetic, the judicious teacher will observe that the introduction of numbers and of the successive digits representing them should be gradual. Examples should at first contain only 1's and 2's; then 1's, 2's, and 3's, until the pupil can add rapidly and correctly in whatever order they are combined.

Then introduce 4's with the preceding, etc. This remark applies also to subtraction, multiplication, etc. In all cases where there is hesitation or forgetfulness, return to special drill, in series, to master the particular number upon which the fault occurs.

The fundamental idea in all numerical combinations is found in *counting in series.* If each step as outlined in this book is mastered as indicated, progress will be easy and rapid, and the result most satisfactory.

Thus, in counting by 6's, the following give all possible additions of 6 with the *units* of any other number:

0+6+6; 1+6+6; 2+6+6; 3+6+6; 4+6+6; 5+6+6; 6+6+6.

Counting back gives all possible subtractions of 6. Multiplication and division, through the limit of each table are involved in counting by 6's to 72; as, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, and similarly for other tables. Observe carefully the models under the several lessons.

At each step, as the pupil becomes familiar with the formal operation of summing the series, he should be led to observe and state *how many times* the recurring number has been used; thus, 6, 12, 18 (6+6+6); there are 3 sixes in 18, or 3 times 6 are 18, etc.

Little real progress can be made even in memorizing until the name of each of the digits becomes to the pupil an intelligible *sign* of the number for which it stands. Thus, the figure 5, or the name *five,* should, upon being seen or heard, as clearly recall the idea of 5 units, singly, and together, as any common word brings up to the mind the idea which it represents.

Care should be taken that the *eye,* as well as the ear, be addressed and cultivated. Skillful oral repetition of the tables does not necessarily produce rapid and correct results, when the pupil has need to perform operations silently. This is an important consideration, inasmuch as the practical use of arithmetic is not *oral,* but *mental,* and the eye and the hand, rather than the ear and the tongue, become the instruments.

BLACKBOARD DRILL.—The blackboard should be a constant accessory in school-room instruction. A few among the many methods which should be used from time to time are suggested:

1. An exercise having been written upon the board, let a pupil, as called upon, go through the exercise as rapidly as is consistent

with accuracy, pupils or teacher indicating errors in such a way as may be deemed expedient. Generally the pupil should be required to *correct* the error himself, when attention is called to it. Another may then take up the work, and so on.

2. Proceed as before, except that each pupil in turn should name *one* step or result, and any error being made, the next should correct it, or, failing to do so, any member of the class may raise his hand, and make the correction. No blunder should be allowed to pass unnoticed.

It is generally advisable that each class exercise illustrated upon the board be also made a *slate exercise* for silent work.

3. When a little familiarity with any class of exercises is secured, the pupils should be encouraged to do the work upon the blackboard themselves, without the intervention of the teacher.

4. From the very first carefulness and neatness in making figures, and in the general form of the written exercises should be required of pupils. Time spent in securing neatness will be regained tenfold in the pupils' subsequent progress, and in the culture in which it will result. This remark applies also to slate exercises. All slate exercises should be carefully examined, and the errors pointed out, and then corrected by the pupil.

Primary arithmetic does not involve any complicated processes of analysis or of reasoning. It deals chiefly with facts, and considers only the simplest and most evident relations of things. It is, therefore, recommended that *formal* analyses be used but sparingly. Those given upon pages 41, 45, 46, and elsewhere, are only suggestive, and after the process (that is, the *nature* of the operation) in any given case is understood, they may be discontinued, or varied, or used only occasionally. They are not in themselves an *end*, but only a *means* of determining the operation to be performed.

It is recommended that wherever *problems* are introduced, the *relations of the things* to which they refer be carefully explained, and then the *relations of the numbers* will be readily understood.

The attention of the pupils may be called to the several steps by judicious questions, and they may also be encouraged to *make problems* suited to numbers given in any case; as, given 5×4; we may say, "What is the cost of 4 yards of tape at 5 cents a yard?" etc.

When problems involve more than one operation, the pupil's attention should be called to the reasons and necessity for each. See example, page 90, Ex. 7.

Most of the lessons may and should be very much extended by additional examples and illustrations, always, however, observing to keep *within the scope and spirit of the lesson.* As, on page 10, no exercise must embrace any *number* beyond 6, nor any combination whose result is greater than 6; on page 50, no *result* greater than 36, and no number greater than 6 used *in producing* the result. In the review of each lesson, all smaller numbers should be used.

The exercise on page 46, and others similar following, do not belong to Fractions, but exhibit a simple form of deduction from multiplication; thus, since 3 times 4 are 12, it follows that 4 is contained 3 times in 12, and also that *one-third* of 12 is 4. It will be well generally to teach these in connection, as on page 101.

Counting in series orally, and as illustrated on the board, should be often repeated, and many exercises may be given besides those contained in the lessons.

FRACTIONS.—No attempt has been made in this book to do more than present the simplest elementary ideas of fractions. Every exercise should be carefully illustrated by objects, and by lines or figures upon the board.

MEASURES.—So far as practicable, each of the tables should be illustrated by *actual objects*, presenting to the senses the values named, and the relations to each other of the different units. Exercises may be much extended, so that intelligent skill shall be acquired.

Even though a class, upon taking up this book, have already acquired some knowledge of numbers, it will be found profitable to review carefully most of the lessons from the beginning, or at least to ascertain that each pupil is skillful in the exercises.

In all oral exercises, so called, the aim should be not to make the pupil simply flippant and ready in repeating a number of *similar* exercises after a model has been given, for this often requires little or no thought, and is practically useless; but what we may call *mental vision* should be cultivated—to bring before the mind all the numbers and conditions involved, and arrange or group them so that the result may become apparent.

COUNTING

The first lesson in numbers to be taught the child is *to count.* He cannot learn the value of *figures* from 1 to 10 until he can count *ten* objects.

The *Numeral Frame* is one of the most convenient aids in teaching *to count,* and the *primary operations* in the use of numbers. When this cannot be had, a box of beans, marbles, or similar objects may be used.

Holding up the frame before the pupils, move the balls on the first wire, one at a time, while the children count *one, two, three, four, five, six, seven, eight, nine, ten.*

Then the exercise may be extended to *twenty,* by moving the balls on *two* wires; then to *thirty,* by moving the balls on *three* wires, and so on to *one hundred.*

When the pupils can count by *ones* to one hundred, they may be taught to count by *twos.* Move *two* balls on one wire, and *two* more on the next, and so on, the pupils saying, *two, four, six, eight, ten, twelve,* etc.

When the pupils can count by *twos* as far as fifty, and have also learned to *write figures* as far as twenty, write a column of 2's on the board, and train them to add the *figures* in the same manner as the balls were counted.

Next, move *one* ball on the first wire, and *two* balls on each succeeding wire, while the pupils say, *one, three, five, seven, nine, eleven,* etc.

After sufficient exercise on these combinations, require them to write a short column of 2's on their slates with a 1 at the bottom, and add them as before, writing the sum below the column.

When sufficiently drilled on *twos,* the same method may be pursued in teaching to count by *threes.* Thus, *three, six, nine, twelve, fifteen,* etc. Then commencing with *one;* thus, *one, four, seven, ten, thirteen,* etc. Then with *two;* thus, *two, five, eight, eleven, fourteen,* etc.

Follow these drills with the same exercises on the slate or board as with the 2's.

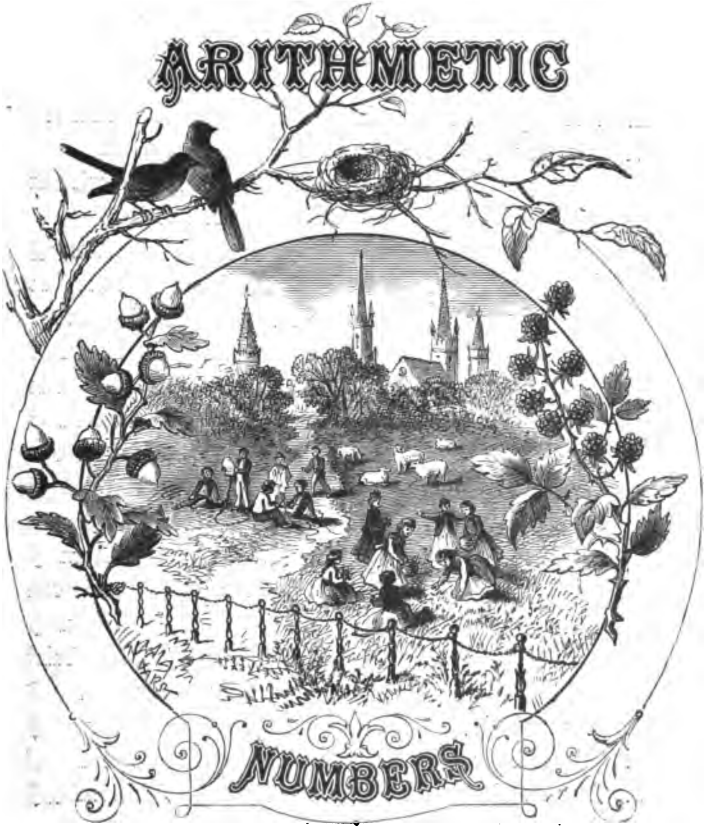
The same method should be pursued in teaching them to count and add by *fours, fives, sixes,* etc.

At the same time that the pupil is thus taught to *count,* and to know *figures* as symbols, he should also be taught their *value,* and the *value of numbers* as associated with the number of objects counted. He should be required to perform the same operations on the *slate* or blackboard with *figures* that he has performed *orally* with *objects.*

The apt teacher, by a judicious use of this frame, may easily teach a child to count from *one* to a *hundred,* and to *add, subtract, multiply,* and *divide* with facility.

The counting and other operations should be done *silently* by the *eye,* and *results* only given by the *voice.*

It is not intended to make a small work like this take the place of the living teacher. The *sample* lessons can contain but a *few* hints and methods to aid the teacher in giving the pupil *something to do;* therefore, the *number* and *variety* of the exercises on each page, both for *oral* and *written* drill, should be increased as the circumstances and the capacity of the child seem to require. The *how* and the *why* can be much better explained by the teacher than by the author, in so limited a space.

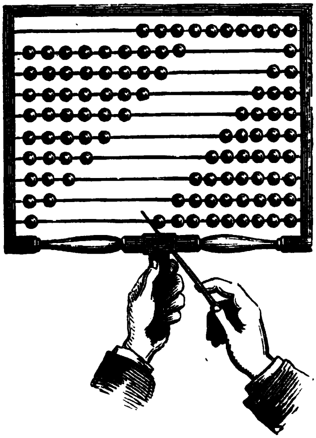


LESSON I.

One	Nest	1	I.	***Six***	Boys	6	VI.
Two	Birds	2	II.	***Seven***	Girls	7	VII.
Three	Leaves	3	III.	***Eight***	Acorns	8	VIII.
Four	Steeples	4	IV.	***Nine***	Berries	9	IX.
Five	Sheep	5	V.	***Ten***	Posts	10	X.

LESSON II.

Here is a picture of a frame, with *ten* wires, and *ten* balls on each wire. It is called a *Numeral Frame.*



COUNTING.

1. On the second wire at the right is one ball. ***One.*** Written *1*

2. How many balls are one ball and one ball more? ***Two.*** Written *2*

3. Two balls and one ball? ***Three.*** Written *3*

4. Three balls and one ball? ***Four.*** Written *4*

5. Four balls and one ball? ***Five.*** Written *5*

6. Five balls and one ball? ***Six.*** Written *6*

7. Six balls and one ball? ***Seven.*** Written *7*

8. Seven balls and one ball? ***Eight.*** Written *8*

9. Eight balls and one ball? ***Nine.*** Written *9*

10. Nine balls and one ball? ***Ten.*** Written *10*

11. How many balls on each wire? *Ten.*

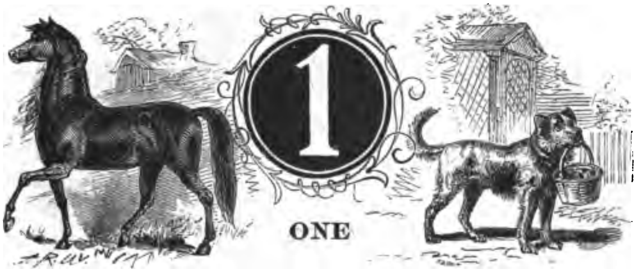
12. Is there any figure that stands for ten?

13. What is the greatest number expressed by one figure?

14. What does 1 mean when it stands alone?

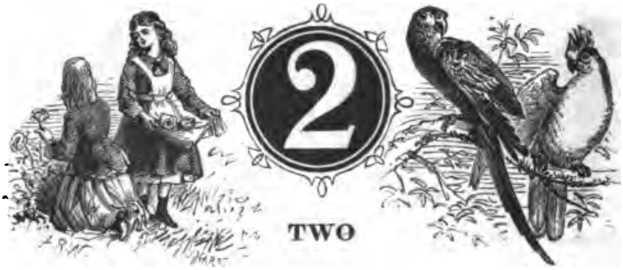
15. What does it mean when it has a 0 on the right of it?

Figures, or Digits.	0,	1,	2,	3,	4,	5,	6,	7,	8,	9.
Names.	**Naught,**	**One,**	**Two,**	**Three,**	**Four,**	**Five,**	**Six,**	**Seven,**	**Eight,**	**Nine.**



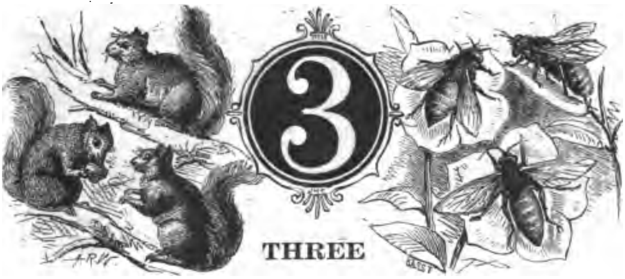
LESSON III.

1. What do you see in the picture?
2. How many horses? How many dogs?
3. What is in the dog's mouth? How many baskets?
4. Show me one book. Point to one boy.
5. Hold up one hand. How many hands have you?
6. Hold up one finger. Hold up one more.
7. One finger and one more are how many fingers?
8. Two fingers are how many more than one finger?
9. One finger is how many less than two fingers?
10. How many ears has the horse? How many, the dog?
11. Make one short line on your slate. /
12. One line and one more are how many lines? //
13. How many ones make two?
14. Rub out one line and how many are left?
15. Two lines less one line are how many lines?
16. What is a single thing called?
17. Write the word *one* on your slate. *One.*
18. Make the figure for *one* on your slate. *1.*
19. How many are one and one more? ***Two.***



LESSON IV.

1. How many girls in this picture? How many birds?
2. How many roses has one girl in her hand?
3. How many roses has the other in her apron?
4. One bird and one bird are how many birds?
5. Two are how many more than one?
6. How many ones make two?
7. How many eyes have you? How many ears?
8. Hold up two fingers. Hold up one more.
9. Make two short lines on your slate. //
10. Make one more. How many are there now? ///
11. Two lines and one line are how many lines?
12. One and two are how many?
13. Two lines are how many less than three lines?
14. Three lines are how many more than two lines?
15. Rub out one line; how many are left?
16. Rub out two more lines; how many are left?
17. Write the word *two* on your slate. *Two.*
18. Make the figure for *two* on your slate. *2.*
19. How many are two and one more? ***Three.***



LESSON V.

1. In the picture, how many squirrels? How many bees? How many squirrels with a nut?

2. Two squirrels and one squirrel are how many?

3. Three bees are how many more than 2 bees?

4. Three less one are how many? Three less 2?

5. How many ones make three?

6. How many are 2 and 1? 1 and 2?

7. Make three short lines on your slate. ///

8. Rub out one line; how many are left?

9. Rub out one more; how many are left?

10. Three less three are how many?

11. Make three lines again. Now one more. ////

12. Three lines and one line are how many lines?

13. Hold up one finger. Two fingers. Three fingers

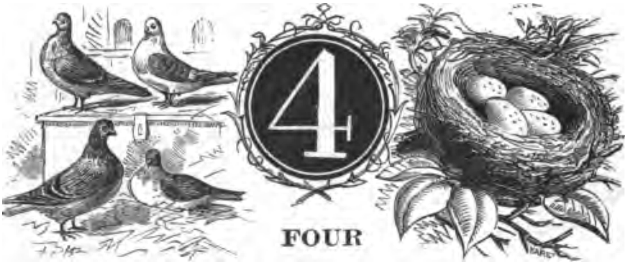
14. Count three. How many ones in three?

15. How many 2's in three? *Ans.* One 2 and 1 over.

16. Write the word *three* on your slate. *Three.*

17. Make the figure that stands for *three.* *3.*

18. How many are three and one more? **Four.**



LESSON VI.

1. How many birds in the picture? How many eggs?

2. How many are 2 birds and 2 birds?

3. How many ones in four?

4. Make 2 short lines; then 2 more. // //

5. How many 2's in four? 2 and 2 are how many?

6. Count four by ones. Count four by 2's.

7. Two birds taken from four birds leave how many?

8. Four less one are how many? Four less 3?

9. How many are 3 and 1? 1 and 3?

10. How many ones in four? How many 2's?

11. How many 3's in four? *Ans.* One 3 and 1 over.

12. Four are how many more than three? How many more than two?

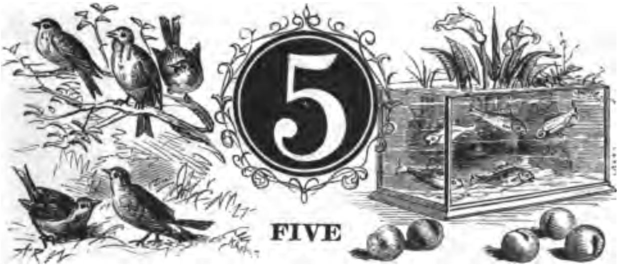
13. How many eggs must be taken from the nest to leave 1 egg? How many to leave 2? To leave 3?

14. Write the word *four* on your slate. *Four.*

15. Make the figure that stands for *four.* *4.*

16. Count from 4 back to one. *Four, three, two, one.*

17. How many are four and one more? ***Five.***



LESSON VII.

1. In this picture how many birds? How many peaches? How many birds on the limb?

2. Five birds are how many more than 4? Than 3?

3. Three birds and 2 birds are how many birds?

4. Two peaches and 3 peaches are how many?

5. Five peaches less 3 peaches are how many?

6. Five peaches less 2 peaches are how many?

7. Two fishes and how many more make five fishes?

8. Three fishes and how many more make five?

9. Make 3 short lines. Now 2 more. */// //*

10. Three and 2 are how many? 2 and 3?

11. Make 4 short lines. Now one more. *//// /*

12. Four and 1 are how many? 1 and 4?

13. If 2 birds fly away, how many are left? If 2 more?

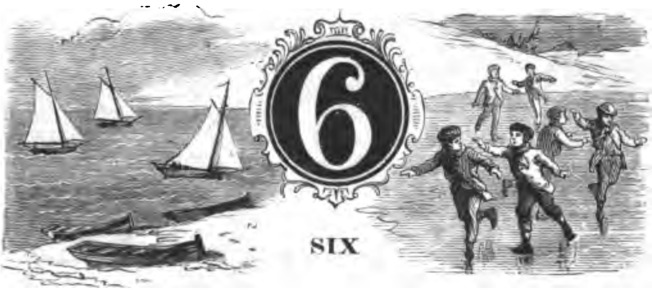
14. How many 2's in five? *Ans.* Two 2's and 1 over.

15. Write the word *five.* *Five.*

16. Write the figure that stands for *five.* *5.*

17. Count five. Count from five back to one.

18. How many are five and one more? ***Six.***



LESSON VIII.

1. There are three boats on the water and three on the land. How many in all? 3 and 3 are how many?

2. How many boys on the ice? How many 2's in six?

3. Three boats from six boats leave how many boats?

4. Six boys are how many more than 4 boys?

5. How many 2's make six? How many 3's make six?

6. Count six by ones. By 2's. By 3's.

7. There are 2 sails on 1 boat; how many on 3 boats?

8. Three 2's are how many? Two 3's are how many?

9. How many are six boats less 5 boats?

10. Four boats and how many more make six boats?

11. Six boys less 2 boys are how many boys? Six boys less 4 boys are how many?

12. Three boats are how many less than six boats?

13. Make six lines by 2's. // // // By 3's. /// ///

14. Write the word *six* on your slate. *Six.*

15. Make the figure that stands for *six*. **6.**

16. Count six. Count from six back to one.

17. How many are six and one more. **Seven.**

LESSON IX.

1. How many boats are 2 boats and 2 boats?

2. How many boys are 2 boys, 2 boys, and 2 boys?

3. Count by 2's to 4. Count by 2's to 6.

4. How many 2's in 6? How many 3's in 6?

5. Six cents are how many more than 3 cents? How many more than 4 cents? Than 2 cents?

6. Repeat this table.

1 and 5 are 6.
2 and 4 are 6.
3 and 3 are 6.
4 and 2 are 6.
5 and 1 are 6.
6 and 0 are 6.

7. 6 from 6 leaves 0.
5 from 6 leaves 1.
4 from 6 leaves 2.
3 from 6 leaves 3.
2 from 6 leaves 4.
1 from 6 leaves 5.

8. A boy had 6 marbles and lost 3; how many marbles had he left?

9. Six marbles less 4 marbles are how many marbles?

10. Mary had 4 cents and Henry gave her 2 cents more. How many cents had she then?

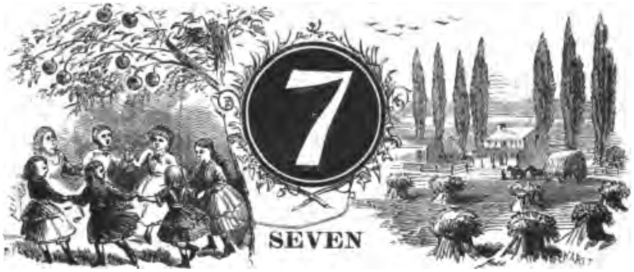
11. Two cents and 4 cents are how many cents?

12. How many balls put with 2 balls will make 6 balls? How many with 4? How many with 3?

13. How many balls taken from 6 balls will leave 3 balls? Will leave 2 balls? Will leave 5 balls?

How many are

14. 2 boys and 4 boys?
15. 3 books and 3 books?
16. 5 pins and 1 pin?
17. 6 men less 2 men?
18. 5 caps less 3 caps?
19. 6 pinks less 5 pinks?



LESSON X.

1. Four trees and 3 trees are how many trees?
2. If 3 trees be cut down, how many will be left?
3. How many apples on the tree? 3 apples and 2 apples and 2 apples are how many apples?
4. If 3 apples fall from the tree, how many are left? If 2 more fall, how many are left?
5. Three girls and how many more make seven girls?
6. Seven bunches of grain are how many more than 5 bunches? Than 3 bunches? Than 2 bunches?
7. How many girls are shown in the picture? If 1 girl leave, how many will remain? If 3 leave? If 4 leave? If 2 leave? If 6 leave?
8. Make 3 lines on your slate. 3 more. /// ///
9. How many more will make seven?
10. How many 3's in seven and how many over?
11. Write the word *seven* on your slate. *Seven.*
12. Make the figure that stands for *seven.* 7.
13. Count seven. Count from seven back to one.
14. How many are seven and one more? ***Eight.***

LESSON XI.

1. How many ones in seven? ///////

2. How many 2's, and how many over?

3. How many 3's, and how many over?

4. Seven girls are how many more than 2 girls? Than 5 girls? Than 1 girl? Than 3 girls? Than 4 girls?

5. Three and how many make 7? 4 and how many? 2 and how many? 5 and how many?

6. Repeat this table.

1 and 6 are 7.
2 and 5 are 7.
3 and 4 are 7.
4 and 3 are 7.
5 and 2 are 7.
6 and 1 are 7.

7. 7 from 7 leaves 0.
6 from 7 leaves 1.
5 from 7 leaves 2.
4 from 7 leaves 3.
3 from 7 leaves 4.
2 from 7 leaves 5.
1 from 7 leaves 6.
0 from 7 leaves 7.

8. James had 7 cents, and gave 5 cents for a pencil How many cents had he left?

9. George gave 4 peaches to his brother and 3 to his sister. How many did he give to both?

10. How many books put with 2 books will make 7 books? How many books are 3 books and 4 books?

11. How many yards of ribbon cut from 7 yards will leave 5 yards? Will leave 1 yard? Will leave 6 yards?

How many are

12. 4 girls and 3 girls?
13. 2 horses and 5 horses?
14. 3 boxes and 4 boxes?
15. 7 trees less 3 trees?
16. 6 houses less 4 houses?
17. 7 figs less 5 figs?

LESSON XII.

1. How many sheep are shown in the picture?

2. There are 4 sheep in one place and 4 in another How many in all? 4 and 4 are how many?

3. Eight cars are how many more than 7? How many more than 6? Than 5? Than 4? Than 3? Than 2?

4. Make eight lines on your slate by 2's. *// // // //* By 4's. *//// ////.*

5. Count eight by 2's. Count eight by 4's.

6. How many 2's in eight? How many 4's?

7. Eight sheep less 4 sheep are how many sheep?

8. If 2 cars are taken from eight cars, how many cars are left? If 5 are taken? If 6 are taken?

9. Four sheep, 3 sheep, and 1 sheep are how many sheep?

10. How many are eight less 6? Eight less 5?

11. Write the word *eight* on your slate. *Eight*

12. Make the figure that stands for *eight.* *8.*

13. Count eight. Count from eight back to one.

14. How many are eight and one more. ***Nine.***

LESSON XIII.

1. How many feet has a sheep? How many feet have 2 sheep? How many 4's in 8?

2. How many hands has one boy? How many have 2 boys? 3 boys? 4 boys?

3. How many boys must hold up both hands, to show 8 hands? How many 2's in 8?

4. Eight are how many more than 7? Than 5? Than 2? Than 6? Than 4?

5. Eight less 6 are how many? 7 less 3 are how many?

6. Repeat this table.

0 and 8 are 8.
1 and 7 are 8.
2 and 6 are 8.
3 and 5 are 8.
4 and 4 are 8.
5 and 3 are 8.
6 and 2 are 8.
7 and 1 are 8.

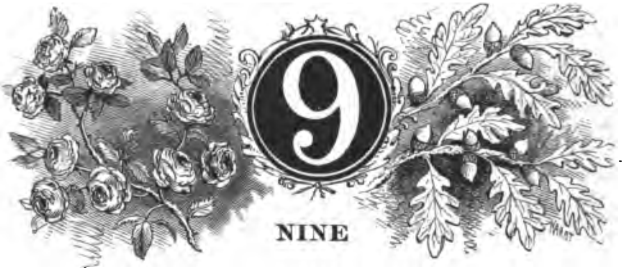
7. 8 from 8 leaves 0.
7 from 8 leaves 1.
6 from 8 leaves 2.
5 from 8 leaves 3.
4 from 8 leaves 4.
3 from 8 leaves 5.
2 from 8 leaves 6.
1 from 8 leaves 7.

8. There are 2 red cars, 1 blue car, and 5 yellow cars in a train. How many in all?

9. If there are 8 horses in a stable and 3 be taken out, how many will be left? If 5 be taken? If 1 be taken?

How many are

10. 4 cows and 4 cows?
11. 6 hens and 2 hens?
12. 1 pail and 7 pails?
13. 3 words and 5 words?
14. 8 men less 1 man?
15. 8 figs less 5 figs?
16. 8 rings less 7 rings?
17. 8 dogs less 3 dogs?



LESSON XIV.

1. In the picture, how many roses are shown? How many acorns?

2. How many acorns on the upper branch? How many on the lower? How many on both branches?

3. Four and 5 are how many? 5 and 4 are how many?

4. Nine less 5 are how many? Less 4 are how many?

5. How many 3's in 6? How many 3's in nine?

6. Nine are how many more than 6? 6 than 3?

7. If 5 acorns drop from the branch, how many are left? If 4 more drop, how many are left?

8. If 3 roses are picked, how many are left? If 3 more? If 3 more?

9. Make nine lines on your slate by 3's. /// /// ///

10. Count nine by ones. Count nine by 3's.

11. How many 4's in nine, and how many over?

12. Write the word *nine*. *Nine.*

13. Make the figure for *nine*. *9.*

14. Count nine. Count back from nine to one.

15. How many are nine and one more? ***Ten.***

LESSON XV.

1. Make nine short lines on your slate. /// /// ///

2. How many ones in 9? How many 3's in 9?

3. If 3 girls have 3 roses each, how many have they all?

4. How many must be taken from 9 to leave 6? To leave 4? To leave 5? To leave 1? To leave 7? To leave 2?

5. Repeat this table.

0 and 9 are 9.
1 and 8 are 9.
2 and 7 are 9.
3 and 6 are 9.
4 and 5 are 9.
5 and 4 are 9.
6 and 3 are 9.
7 and 2 are 9.
8 and 1 are 9.
9 and 0 are 9.

6. 9 from 9 leaves 0.
8 from 9 leaves 1.
7 from 9 leaves 2.
6 from 9 leaves 3.
5 from 9 leaves 4.
4 from 9 leaves 5.
3 from 9 leaves 6.
2 from 9 leaves 7.
1 from 9 leaves 8.
0 from 9 leaves 9.

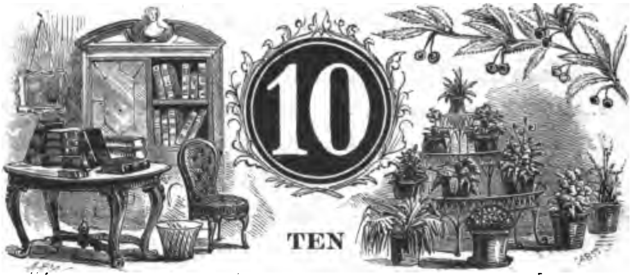
7. There are 9 leaves on two branches. If 4 leaves are on one of the branches, how many are on the other?

8. A boy had 5 peaches in one pocket, and 4 in another. How many had he in both?

9. If he give away 2 peaches out of each pocket, how many will he have left?

How many are

10. 7 tops and 2 tops?
11. 3 dollars and 6 dollars?
12. 8 pencils and 1 pencil?
13. 4 nuts and 5 nuts?
14. 9 eggs less 2 eggs?
15. 7 birds less 5 birds?
16. 8 cats less 7 cats?
17. 9 mice less 4 mice?



LESSON XVI.

1. Make 5 short lines ; then 5 more lines. ///// /////

2. How many ones make ten? How many 5's make ten?

3. In the picture, how many books are on the upper shelf of the bookcase ? How many on the lower ?

4. How many cherries on the branch ?

5. If 2 cherries are picked, how many remain ?

6. If 2 more are picked, how many are left ? If 2 more ?

7. Ten cherries less 8 cherries are how many cherries ?

8. Make ten short lines by 2's. // // // // //

9. Count ten by 2's. Count ten by 5's.

10. How many flower-pots are on the ground ? How many are on the stand ? How many in all ?

11. Six pots and 4 pots are how many pots ?

12. Ten pots less 6 pots are how many ?

13. Name each of the numbers that can be expressed by a single figure.

14. How is the number *ten* expressed ?

15. Write the word, *ten.* *Ten.*

16. Make the figures to express *ten.* *10.*

LESSON XVII.

1. Make ten short lines on your slate. //////////

2. Ten are how many ones? How many 2's? 5's?

3. How many 4's in 10, and how many over?

4. How many must be taken from 10 to leave 5? To leave 4? To leave 7? To leave 3? To leave 2?

5. John had 6 marbles and bought 4 more. How many had he then?

6. Mary had 10 cents and gave 3 cents for a pencil. How many had she left?

7. Repeat this table.

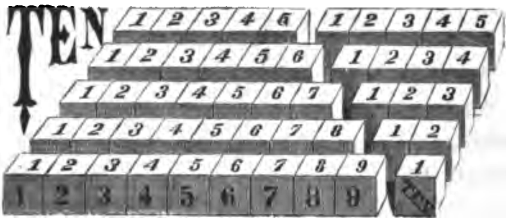
0 and 10 are 10.
1 and 9 are 10.
2 and 8 are 10.
3 and 7 are 10.
4 and 6 are 10.
5 and 5 are 10.
6 and 4 are 10.
7 and 3 are 10.
8 and 2 are 10.
9 and 1 are 10.

8. 10 from 10 leaves 0.
9 from 10 leaves 1.
8 from 10 leaves 2.
7 from 10 leaves 3.
6 from 10 leaves 4.
5 from 10 leaves 5.
4 from 10 leaves 6.
3 from 10 leaves 7.
2 from 10 leaves 8.
1 from 10 leaves 9.

How many are

9. 5 pins and 5 pins?
10. 3 trees and 7 trees?
11. 6 birds and 4 birds?
12. 2 sheep and 8 sheep?
13. 9 plums less 5 plums?
14. 10 pears less 7 pears?
15. 8 pens less 5 pens?
16. 10 figs less 9 figs?

In all these lessons of counting in *series*, the teacher should use objects, or the numeral frame, until the pupil thoroughly understands the process.



LESSON XVIII.

REVIEW.

1. In the picture, how many blocks in each row?

2. In the lower row, how many blocks in the larger part?

3. Nine blocks and 1 more are how many? 1 and 9?

4. Eight blocks and 2 more are how many? 2 and 8?

5. Ten blocks less 8 blocks are how many? 10 less 2?

6. Ten blocks less 3 blocks are how many? 10 less 7?

7. Seven blocks and 3 more are how many? 3 and 7?

8. Six blocks and how many more make 10? 4 and how many make 10?

9. Ten blocks less 6 blocks are how many? 10 less how many are 6?

10. Seven and how many make 10? 3 and how many make 10?

11. Ten blocks less 5 blocks are how many? 5 from 10 leave how many?

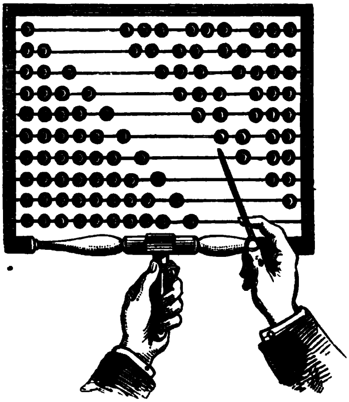
12. How many and 5 make 10? How many from 10 leave 5?

13. How many 5's in 10? How many 6's in 10?

Ans. One 6, and 4 over.

LESSON XIX.

REVIEW.



COUNTING.

1. Count by ones to ten.

2. Count by 2's to 4.

3. Count by 2's to 6.

4. Count by 3's to 6.

5. Count by 2's to 8.

6. Count by 4's to 8.

7. Count by 3's to 9.

8. Count by 2's to 10.

9. Count by 5's to 10.

10. How many 2's in 4?

11. How many 3's in 6?

12. How many 4's in 8?

13. How many 3's in 9?

14. How many 5's in 10?

15. Jane picked 4 pinks from one stem, 3 from another, and 2 from another. How many pinks had she?

16. Oscar had 10 cents, and gave 2 cents for a pen and 5 cents for a pencil. How many cents had he left?

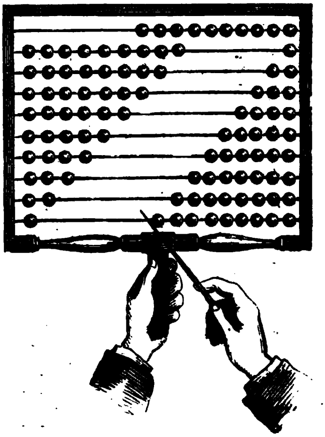
17. If there are 6 birds in one cage and 4 in another, how many birds in both cages? How many more in one than in the other?

18. Willie caught five fishes; how many more must he catch to have 8?

19. There are seven cherries on one part of a twig, and 3 on another. How many cherries on both parts?

20. If 5 cherries are picked, how many will be left?

LESSON XX.



COUNTING.

1. How many balls on the upper wire of the Numeral Frame.

2. How many are ten balls and one ball more?

Eleven. Written *11*

3. How many are eleven balls and one ball?

Twelve. Written *12*

4. Twelve balls and one more are

Thirteen. Written *13*

5. Thirteen balls and one more are

Fourteen. Written *14*

		Written
6. Fourteen and one more are	***Fifteen.***	*15*
7. Fifteen and one more are	***Sixteen.***	*16*
8. Sixteen and one more are	***Seventeen.***	*17*
9. Seventeen and one more are	***Eighteen.***	*18*
10. Eighteen and one more are	***Nineteen.***	*19*
11. Nineteen and one more are	***Twenty.***	*20*

12. Count from one to twenty.

13. How many units in the number one? In the number ten? Write the figures for ten. *10*

14. What does the 0, or *cipher*, denote? *Ans.* No ***units.***

15. What does the 1 denote? *Ans.* One ***ten.***

16. Then, what do the figures 10 denote?

Ans. 1 ***ten*** and 0 ***units,*** or ***ten.***

LESSON XXI.

1. When two figures are written side by side, what does each figure denote?

2. The one on the *right* denotes ***units,*** and the one on the *left* denotes ***tens.***

3. What do the figures 11 denote?

Ans. 1 *ten* and 1 *unit,* or *eleven.*

4. What do the figures 12 denote?

Ans. 1 *ten* and 2 *units,* or *twelve.*

5. What do the figures 15 denote?

Ans. 1 *ten* and 5 *units,* or *fifteen.*

6. Write the figures that stand for twenty. *20*

7. How many *tens* are there in twenty?

8. What do the figures 20 denote?

Ans. 2 *tens* and 0 *units,* or *twenty.*

9. What then do the figures 21 denote?

Ans. 2 *tens* and 1 *unit,* or *twenty-one.*

		Written
10.	Two tens and two units are ***Twenty-two.***	*22*
11.	Two tens and three units are ***Twenty-three.***	*23*
12.	Two tens and four units are ***Twenty-four.***	*24*
13.	Two tens and five units are ***Twenty-five.***	*25*
14.	Two tens and six units are ***Twenty-six.***	*26*
15.	Two tens and seven units are ***Twenty-seven.***	*27*
16.	Two tens and eight units are ***Twenty-eight.***	*28*
17.	Two tens and nine units are ***Twenty-nine.***	*29*
18.	*Three* tens and no units are ***Thirty.***	*30*

19. Count from one to thirty.

20. Write the numbers from one to thirty.

LESSON XXII.

1. How many *units* are ten? Are twenty? Are thirty?

2. How many *tens* are ten? Are twenty? Are thirty?

3. Count thirty. Write the figures that stand for thirty. *30*

4. Write the figures that stand for thirty-one. For thirty-two. For thirty-three.

5. What do the figures 34 denote?

Ans. 3 *tens* and 4 *units,* or *thirty-four.*

6. Count from thirty to forty.

7. Write the numbers from thirty to forty.

8. How many *units* are four tens? How many tens are forty?

9. Make the figures that stand for forty. *40*

10. Write the figures for forty-three. For forty-four.

11. What do the figures 45 denote?

Ans. 4 *tens* and 5 *units,* or *forty-five.*

12. Count from forty to fifty.

13. Write the numbers from forty to fifty.

14. How many tens are fifty? How many units?

15. Write the figures that stand for fifty. *50*

16. What do the figures 56 denote?

Ans. 5 *tens* and 6 *units,* or *fifty-six.*

17. Count from fifty to sixty.

18. Write the numbers from fifty to sixty.

19. How many tens are sixty? How many units?

20. Write the figures that stand for sixty. *60*

21. What do the figures 67 denote?

Ans. 6 *tens* and 7 *units,* or *sixty-seven.*

LESSON XXIII.

1. Count from sixty to seventy. Write the numbers from sixty to seventy.

2. How many tens are seventy? How many units?

3. Write the figures that stand for seventy. *70*

4. Write the figures for seventy-five. For seventy-seven.

5. What do the figures 78 denote?

Ans. 7 *tens* and 8 *units,* or *seventy-eight.*

6. Make the figures denoting seventy-two. Sixty-five. Seventy-four. Sixty-three. Seventy-one.

7. Count from seventy to eighty. Write the numbers from seventy to eighty.

8. How many tens are eighty? How many units?

9. Write the figures that stand for eighty. *80*

10. For eighty-one. For eighty-two. For eighty-three.

11. What do the figures 87 denote?

Ans. 8 *tens* and 7 *units,* or *eighty-seven.*

12. Count from eighty to ninety. Write the numbers from eighty to ninety.

13. How many tens are ninety? How many units?

14. Count from ninety to one hundred.

15. Write the figures that stand for ninety. *90*

16. What do the figures 99 denote?

Ans. 9 *tens* and 9 *units,* or *ninety-nine.*

17. The greatest number that can be expressed by two figures is 99.

18. Ninety-nine and one more are ***one hundred.***

Written *100*

19. What does 1 mean with two 0's on the right?

● ● *and* ● ● ●
are ● ● ● ● ●

2 + 3 are 5

● ● ● *and* ● ●
are ● ● ● ● ●

3 + 2 are 5

PLUS.

LESSON XXIV.

1. Make a short *horizontal* line on your slate; thus, —.

2. Make a short *vertical* line on your slate; thus, |.

3. Make these two lines to *cross* each other; thus, +.

4. Because + shows what is to be done, it is called a *Sign.*

5. This sign + is named ***Plus,*** and *plus* means *more.*

6. The sign + is used in place of the word *and;* thus, instead of writing 2 *and* 3 are 5, we may write 2 + 3 are 5, which means 2 *and* 3 *more* are 5; and is read 2 *plus* 3 are 5.

7. Read the following:

5 + 4 are 9.
2 + 5 are 7.
3 + 6 are 9.
4 + 4 are 8.
6 + 4 are 10.
7 + 2 are 9.

8. How many are

4 + 3?
2 + 6?
5 + 3?
7 + 2?
4 + 5?
5 + 5?
3 + 7?
8 + 1?
6 + 2?
3 + 4?
4 + 6?
8 + 2?

The foregoing, with their *results,* may be copied on the slate; thus, 4 + 3 are 7, etc.

ADDITION

LESSON XXV.

1. Counting two or more numbers of the same kind together, so as to find what number they all equal, is called *adding*, or ***Addition.***

2. The *Plus Sign*, +, is the sign of *Addition.*

3. The sign + shows that what is written at the right of it is to be *added to* what is written before it. Thus, 4 + 3 means that 3 is to be *added* to 4.

4. The number obtained by adding is called the ***Sum.*** Thus, 9 is the *sum* of 5 and 4, or 5 + 4.

5. Usually, when numbers are to be *added,* they are written in a *vertical* line, or column.

6. *Add* the numbers 2, 3, and 4, writing them as shown in the margin, and draw a line under the column. We first find that 4 and 3 are 7, and next, that 7 and 2 more are 9, which we write below the line for the *sum* of 2, 3, and 4.

2
3
4
Sum 9

Exercises for the Slate and Blackboard.

7. In like manner copy and add the following:

1	3	2	1	2	3	2	4	3	2
2	4	3	3	5	3	5	3	4	3
3	2	1	4	1	4	2	1	3	2

●●● } *are*
and ●● } ●●●●●

$3 + 2 = 5$

●● *and* } *are*
●●● } ●●●●●

$2 + 3 = 5$

EQUALITY.

LESSON XXVI.

1. Make two horizontal lines; thus, $=$.

2. Are these two lines *equal* or *unequal* in length?

3. Since these two lines $=$ are equal, we will hereafter use them to mean *equal,* in place of the word *equal,* or of the word *are.* Thus,

4. Instead of writing 3 *and* 2 *are* 5, or $3 + 2$ *equal* 5, we may write $3 + 2 = 5$.

5. Because these two lines mean *equal,* they are called the ***Sign of Equality.***

6. Copy and read the following:

$4 + 2 = 6$. $3 + 4 = 7$. $5 + 4 = 9$. $7 + 3 = 10$.

7. Write the following, using figures and signs:

Three and five equal eight. Six and three equal nine.
Eight and two equal ten. Nine and one equal ten.

8. In the following examples, $= ?$ means "*equal how many.*" In copying, find the *sum* and write it in the place of the question mark (?).

$4 + 2 = ?$ $5 + 5 = ?$ $3 + 3 + 3 = ?$
$6 + 2 = ?$ $5 + 4 = ?$ $2 + 2 + 2 = ?$
$5 + 3 = ?$ $8 + 2 = ?$ $2 + 3 + 4 = ?$

LESSON XXVII.

1. If a spool of thread costs 6 cents and a yard of tape 4 cents, how much do both cost?

2. Henry rode 7 miles and walked 2 miles. How far did he go?

3. A tailor sold 5 yards of cloth at one time and 5 yards at another. How many yards did he sell in all?

4. Carrie had 4 roses and Nellie had 3. How many roses had both?

5. In a fruit-dish are 5 red apples and 4 green ones. How many apples in the dish?

6. Two birds sit on one limb, 3 on another, and 5 on another. How many birds in all?

7. A man paid 3 dollars for a cord of wood and 6 dollars for a ton of coal. How much did he pay for both?

8. Susie bought a yard of ribbon for 7 cents and some buttons for 3 cents. How much did she pay for both?

9. Begin with 1 and count 9 by 2's; thus, *one, three, five, seven, nine.*

10. Begin with 1 and count 10 by 3's; thus, *one, four, seven, ten.*

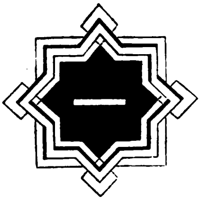
11. Copy and add the following on your slate:

2	2	2	3	2	1	1	1	3
2	2	1	3	3	2	3	1	1
2	2	2	2	1	1	2	2	1
2	2	1	1	2	3	1	2	2
2	1	2	1	1	1	2	3	1

The pupil should be required to *add* as he *counts*, only naming each successive result

●●●●● } *are* ●●●
less ●●

5 — 2 = 3



●●●●● } *are* ●●
less ●●●

5 — 3 = 2

MINUS.

LESSON XXVIII.

1. Make a short horizontal line on your slate; thus, —.

2. A line written thus —, between two numbers, is used to mean *less,* in place of the word *less.* Thus,

3. Instead of writing, 2 from 5 leaves 3, or 5 *less* 2 *equals* 3, we may write 5 — 2 = 3.

4. The sign — is named ***Minus***, and *minus* means *less.*

5. Read the following:

8 — 2 = 6.   9 — 5 = 4.   10 — 4 = 6.   8 — 6 = 2.
7 — 3 = 4.   6 — 6 = 0.   7 — 4 = 3.   10 — 3 = 7.
9 — 4 = 5.   8 — 5 = 3.   9 — 2 = 7.   7 — 7 = 0.

6. Write the following, using figures and signs:

Nine less two equals seven.   Ten less five equals five.
Seven less two equals five.   Eight less one equals seven.
Six less four equals two.   Seven less four equals three.

7. Copy the following, writing the *result* in place of the question mark (?).

8 — 1 = ?   5 — 4 = ?   5 — 5 = ?   10 — 2 = ?
7 — 5 = ?   10 — 6 = ?   9 — 6 = ?   9 — 8 = ?
9 — 3 = ?   7 — 2 = ?   8 — 7 = ?   3 — 3 = ?

SUBTRACTION

LESSON XXIX.

1. Taking one number from another of the same kind is called *subtracting*, or ***Subtraction.***

2. The *Minus Sign* — is the sign of *Subtraction.*

3. The sign — shows that what is written at the right is to be *taken from* what is written before it. Thus, 6 — 4 means that 4 is to be *subtracted* from 6.

4. The number that shows how many *remain* after subtracting is called the ***Remainder,*** sometimes the ***Difference.*** Thus,

5 is the *remainder* after taking 4 from 9, or 5 is the *difference* between 9 and 4, written 9 — 4 = 5.

5. Find the *remainder* of

7 less 5 10 less 4 8 — 4 7 — 6

9 less 2 6 less 6 9 — 6 10 — 2

6. In performing Subtraction, the numbers when written are usually arranged as in the margin, the smaller under the greater, with a line drawn underneath. We say 4 from 7 leaves 3, which we write below the line for the *remainder.*

$$\begin{array}{r}7\\ \underline{4}\\ 3\end{array}$$

EXERCISES FOR THE SLATE AND BOARD.

7. Copy and write the remainder in each of the following:

$$\begin{array}{cccccccccc}5 & 6 & 8 & 7 & 9 & 10 & 8 & 10 & 7 & 9\\ \underline{3} & \underline{4} & \underline{2} & \underline{5} & \underline{3} & \underline{7} & \underline{5} & \underline{5} & \underline{7} & \underline{2}\end{array}$$

LESSON XXX.

1. Here is a picture of twelve stars.

2. Count twelve. Make the figures for twelve. *12*

3. Count from 12 back to 1.

4. Count by 2's to 8. Count from 8 back to 0.

Ans. Eight, six, four, two, naught.

5. How many are 8 less 2? 6 less 2? 4 less 2? 2 less 2?

6. Count by 2's to 10. Count from 10 back to 0.

7. How many are 10 less 2? 8 less 2? 6 less 2?

8. Count by 2's to 12. Count from 12 back to 0.

9. Count by 3's to 9. Count from 9 back to 0.

10. How many are 9 less 3? 6 less 3? 3 less 3?

11. Count by 3's to 12. Count from 12 back to 0.

12. How many are 12 less 3? 9 less 3? 6 less 3? 3 less 3?

13. How many 3's in 12? How many 2's?

14. If there are 12 sheep in a yard and 3 jump out, how many sheep are left? $12 - 3 = ?$

15. If 3 more jump out, how many are left? $9 - 3 = ?$

16. If 3 more jump out, how many are left? $6 - 3 = ?$

17. If 3 more jump out, how many are left? $3 - 3 = ?$

18. Write on your slates the following, using the proper *signs* and the correct number in the place of the (?).

3 and 3 and 3 are 9.
2 and 3 and 3 = ?
3 and 1 and 3 are 7.
2 and 3 and 2 = ?

9 less 5 equal 4.
10 less 7 = ?
5 from 8 leaves ?
6 from 9 leaves 3.

LESSON XXXI.

1. Begin with 1 and count by 2's to 11.

Ans. One, three, five, seven, nine, eleven.

2. Begin with 1 and count by 2's to 13.

3. Begin with 1 and count by 3's to 10. By 3's from 1 to 13. From 2 to 14.

4. Begin with 2 and count by 3's to 11. By 3's from 2 to 14.

5. Begin with 1 and count by 4's to 9. By 4's from 2 to 10.

6. Begin with 2 and count by 4's to 14. By 4's from 3 to 15.

EXERCISES FOR THE SLATE AND BOARD.

7. In like manner *count* and find the *sum* in each of the following:

3	3	3	2	4	4	1	2	3	0
3	4	3	2	4	3	2	3	2	3
3	3	3	2	4	2	3	4	1	4
3	1	2	2	4	1	3	1	4	4

8. Find the *remainder* to each of the following:

7	9	6	8	7	9	10	11	5	12
3	4	6	3	6	3	4	7	2	8

9. Find and write the *result* in each of the following:

4+4+1=?
3+3+3+3=?
2+4+3+1=?
1+3+0+4=?

2+2+2+2+2=?
3+3+3+2+1=?
1+2+3+4+0=?
3+1+4+2+1=?

9−1=?
10−7=?
5−5=?
8−6=?

LESSON XXXII.

1. Four and four are how many?

2. Eight and 4 are how many? 12 and 4?

3. Count 12 by 4's. How many 4's in 12?

4. Four from 12 leaves how many? 4 from 8?

5. Twelve are how many more than 8? More than 4?

6. Four and how many make 8? 8 are how many less than 12?

7. Begin with 1 and count by 4's to 17.

Ans. One, five, nine, thirteen, seventeen.

8. Begin with 2 and count by 4's to 18.

9. Begin with 3 and count by 4's to 19.

10. Begin with 0 and count by 4's to 20.

11. How many are 20 less 4? 16 less 4? 12 less 4?

When the *Sum* of two or more numbers, or the *Difference* of two numbers, is named instantly, it is called addition, or subtraction, *at sight.* Thus, in the example 4 + 3, say 7, instead of, 4 and 3 are 7.

Addition at Sight.

4	4	2	1	3	3	5	4	4	4
4	3	4	5	3	4	3	6	8	7

Subtraction at Sight.

4	8	6	5	7	8	7	6	9	8
4	4	3	2	3	5	4	5	5	3

At recitation the teacher may write similar exercises on the board, and point from one set of numbers to another, as rapidly as *the class can name* the results.

LESSON XXXIII.

1. Four are how many less than 9? 9 are how many more than 5?

2. How many are 12 less 7? 12 less 5 are how many?

3. Ira gave 5 cents for a pencil and 4 cents for a top. How much did both cost?

4. John has 6 books and Jane has 5 books. How many books have both?

5. James gave 7 cents for a writing-book and had 5 cents left. How many cents had he at first?

6. $8 + 4 = ?$ $3 + 5 + 2 = ?$ $10 - 5 = ?$
$7 + 5 = ?$ $4 + 5 + 2 = ?$ $11 - 3 = ?$
$8 + 3 = ?$ $6 + 4 + 4 = ?$ $12 - 4 = ?$

7. Asa is 9 years old; how old will he be 4 years hence?

8. Martha is 12 years old; her sister is 4 years younger. How old is her sister?

9. There were 11 geese and 4 ducks swimming on the pond. How many are there of both? How many more geese than ducks?

10. A beggar met two boys; one gave him 5 cents, the other gave him 4. How many cents did both give him?

EXERCISES FOR SLATE AND BOARD.

11 Copy and add:

4	4	4	4	4	4	3	5	2	1
4	4	4	4	3	4	4	2	4	2
4	4	4	4	5	3	2	4	3	4
4	3	2	1	3	2	1	2	4	5
—	—	—	—	—	—	—	—	—	—

LESSON XXXIV.

1. How many are 5 cents and 5 cents?

2. How many are 10 cents and 5 cents more?

3. How many are 15 cents and 5 cents more?

4. Count 10 by 5's. Count 15 by 5's. Count 20 by 5's.

5. How many 5's in 10? How many 5's in 15? How many 5's in 20?

6. Twenty less 5 are how many? 15 less 5? 10 less 5?

7. How many are

5 + 5?
4 + 5?
3 + 5?
2 + 5?

2 + 5 + 5?
3 + 5 + 5?
4 + 5 + 5?
5 + 5 + 5?

20 — 5?
15 — 5?
10 — 5?
5 — 5?

14 — 5?
13 — 5?
12 — 5?
17 — 5?

8. Count by 5's from 15 back to 0. From 20 back to 0.

9. Count by 5's to 25. From 25 back to 0.

10. Twenty-five less 5 are how many? 20 less 5? 15 less 5? 10 less 5? 5 less 5?

11. Count by 5's from 1 to 16. From 2 to 17. From 3 to 18. From 4 to 19.

EXERCISES FOR THE SLATE AND BOARD.

12. Copy, count, and write the *sum* of the following:

5	5	5	5	5	1	2	3	2	4
5	5	5	5	5	5	5	2	5	1
5	5	5	5	5	5	5	1	3	2
5	5	5	5	5	5	5	4	1	3
5	1	2	3	4	5	5	5	4	5

Vary this exercise in a thorough drill, making all combinations *with figures not greater* than 5, and making a *sum not to exceed* 25.

LESSON XXXV.

1. How many 5's in 10? How many 2's?

2. How many 5's in 15? How many 3's?

3. How many 5's in 20? How many 4's?

4. Count 25 by 2's, beginning with 1. Count 25 by 5's.

5. Begin with 4 and count by 3's to 25.

6. How many are 8 boys and 4 boys? 12 boys less 4 boys? 13 boys less 5 boys?

7. How many are 6 girls and 5 girls? 11 girls less 5 girls? 12 girls and 5 girls?

8. How many are 15 marbles less 5 marbles? 15—5=?

9. Fourteen books less 5 books are how many books?

10. Asa had 12 marbles and lost all but 5; how many did he lose?

EXERCISES FOR THE SLATE AND BOARD.

11. Write the proper numbers in place of (?):

5+?=6   8+5=?   10+?=15   8+?=10

?—2=5   10—5=?   12—?= 2   10—?= 8

3+?=7   ?+5=12   ?+2=12   15—?=10

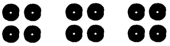
Addition.

5	5	3	?	?	9	5	?	?	2
4	6	?	9	7	?	10	10	8	9
?	?	10	11	9	14	?	15	12	?

Subtraction.

9	12	10	?	?	14	8	?	15	9
?	?	7	6	3	?	?	7	5	9
5	7	?	4	6	10	0	1	?	?

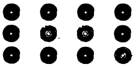
3 *fours* are 12



3 *times* 4 are 12

$4 \times 3 = 12$

4 *threes* are 12



4 *times* 3 are 12

$3 \times 4 = 12$

MULTIPLICATION.

LESSON XXXVI.

1. If you pay 4 cents for 1 lemon, how many times 4 cents must you pay for 3 lemons? $4 + 4 + 4 = ?$ How many are three 4's?

2. Instead of writing $4 + 4 + 4 = 12$, we may write 3 *times* 4 are 12.

3. If 1 orange cost 3 cents, how many times 3 cents must you give for 4 oranges? $3 + 3 + 3 + 3 = ?$ How many are four 3's?

4. Instead of writing $3 + 3 + 3 + 3 = 12$, we may write 4 *times* 3 are 12.

5. Make a short line on your slate, *inclined;* thus, /

6. Make another short line, *inclined;* thus, \

7. Make these two lines cross each other; thus, ×

8. This sign, ×, is used in place of the word *times;* thus, instead of writing 3 *times* 4 are 12, or 4 *times* 3 are 12, we may write 4×3 are 12, or $3 \times 4 = 12$.

9. Read the following:

2×3 are 6.
3×3 are 9.
1×4 are 4.
4×3 are 12.
3×4 are 12.
0×3 are 0.
$4 \times 2 = 8$.
$5 \times 2 = 10$.
$5 \times 3 = 15$.

MULTIPLICATION

LESSON XXXVII.

1. If you take 4 peaches 3 times from a fruit dish, how many peaches will you take in all?

2. How many peaches are 3 times 4 peaches?

3. When 4 is taken as many times as there are ones or units in 3, how many times is it taken?

4. Taking one of two numbers as many times as there are ones or units in another is called ***Multiplication.***

5. The × is called the ***Sign of Multiplication.*** It is read *times,* or *multiplied by;* thus, 3 × 2 is read 3 *multiplied by* 2, or 2 *times* 3; 4 × 3 is read 4 *multiplied by* 3, or 3 *times* 4.

6. The number obtained by multiplying one number by another is called the ***Product.***

MULTIPLICATION TABLE.

2×0= 0	3×0= 0	4×0= 0	5×0= 0
2×1= 2	3×1= 3	4×1= 4	5×1= 5
2×2= 4	3×2= 6	4×2= 8	5×2=10
2×3= 6	3×3= 9	4×3=12	5×3=15
2×4= 8	3×4=12	4×4=16	5×4=20
2×5=10	3×5=15	4×5=20	5×5=25

The above tables should be thoroughly memorized and repeated both in the *direct* and *reverse* order; thus, 2 times 3 are 6, 3 times 2 are 6, 2 times 4 are 8, 4 times 2 are 8, etc.

LESSON XXXVIII.

1. How many oranges are 5 times 3 oranges?

2. There are two ways of solving this example.

FIRST.—Write the figure 3 *five* times in a column, and draw a short line under it. Then count, or add, thus: 3, 6, 9, 12, 15, and write the result below the line.

SECOND.—Write the figure 3 but *once*, and write the figure 5 under it, to show *how many times* 3 is to be taken, and draw a short line. Then say 5 times 3 are 15, and write the result below the line. The result is 15 in both cases, but in the first case it is obtained by *addition* and is called the *Sum*; in the second case, it is obtained by *multiplication* and is called the *Product*. Hence,

FIRST.
By Addition.

$$\begin{array}{rl} 3 & \\ 3 & \\ 3 & \\ 3 & \\ \underline{3} & \\ 15 & \textit{Sum.} \end{array}$$

SECOND.
By Multiplication.

$$\begin{array}{rl} 3 & \\ \underline{5} & \\ 15 & \textit{Product.} \end{array}$$

3. ***Multiplication** is also a short method of **adding equal numbers.***

5 × 2 = ? 5 × 5 = ? 3 × 5 = ? 4 × 5 = ?
5 × 3 = ? 3 × 4 = ? 3 × 3 = ? 4 × 4 = ?

EXERCISES FOR THE SLATE AND BOARD.

Find the result by Addition and by Multiplication

4. Of 2 times 5 cents.
5. Of 4 times 3 figs.
6. Of 3 times 5 marbles.
7. Of 5 times 4 hats.
8. Of 5 times 2 boys.
9. Of 4 times 5 peaches.

LESSON XXXIX.

1. How many peaches are there on 3 plates, if there are 5 peaches on each plate?

Solution.—Since there are 5 peaches on one plate, on 3 plates there are 3 times 5 peaches, which are 15 peaches. Hence, there are 15 peaches on 3 plates.

2. If a yard of ribbon cost 4 cents, how much will 3 yards cost?

3. If 1 orange cost 5 cents, what will 2 oranges cost?

4. How much will 4 pencils cost, if 1 pencil cost 5 cents?

5. How many eggs in 3 nests, if there are 3 eggs in each nest?

6. How many marbles have 4 boys, if each boy has 5 marbles?

7. How many fishes did 3 boys catch, if each boy caught 5 fishes?

8. Mary gave 5 cents a yard for 5 yards of ribbon. How many cents did she give for the whole?

9. Which is greater, 4 times 5, or 5 times 4?

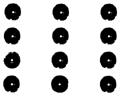
10. How much greater is 4 times 3 than 2 times 5?

11. What is the difference in the cost of 3 oranges at 5 cents a piece, and 5 lemons at 3 cents a piece?

Exercises for the Slate and Board.

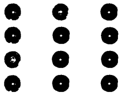
Multiplication at Sight.

5	4	3	4	4	5	5	3	5	5
2	3	5	4	5	3	4	3	0	5



4 in 12, 3 times.

$12 \div 4 = 3$



1 *third* of 12 is 4

$\frac{12}{3} = 4$

DIVISION.

LESSON XL.

1. I had 12 marbles and gave 4 to James; how many had I left?

2. I gave 4 more to Louis; then, how many had I left?

3. I gave 4 more to Asa; then, how many had I left?

4. How many times 4 marbles did I give away?

5. How many are 12 less 4? 8 less 4? 4 less 4?

6. How many times can 4 marbles be taken from 12 marbles? How many 4's in 12?

7. Instead of saying that 4 can be taken from 12, 3 *times*, or that there are 3 *fours* in 12, say, 4 is *contained in* 12, 3 times.

8. Make a short horizontal line on your slate; thus, —

9. Make two dots, one above, and one below the line; thus, ÷

10. This sign, ÷, is used in place of the words *divided by;* thus, instead of writing 12 *divided by* 4, write 12 ÷ 4.

11. Express by figures and the proper signs: Two is contained in twelve, six times. Four is contained in twenty, five times. Five is contained in twenty-five, five times.

DIVISION

LESSON XLI

1. How many oranges, at five cents each, can you buy for 15 cents?

2. How many times can 5 cents be taken from 15 cents?

3. How many times 5 cents in 15 cents? 5 is contained in 15 how many times? 15 ÷ 5 = ?

4. Finding how many times one number is contained in another is called ***Division.***

5. The sign, ÷, is called the ***Sign of Division.*** It is read, *divided by;* thus, 15÷5 is read, 15 *divided by* 5.

6. The number obtained by dividing one number by another is called the ***Quotient.***

DIVISION TABLE.

0÷2=0
2÷2=1
4÷2=2
6÷2=3
8÷2=4
10÷2=5

0÷3=0
3÷3=1
6÷3=2
9÷3=3
12÷3=4
15÷3=5

0÷4=0
4÷4=1
8÷4=2
12÷4=3
16÷4=4
20÷4=5

0÷5=0
5÷5=1
10÷5=2
15÷5=3
20÷5=4
25÷5=5

7. Write the following, putting the *quotient* after the sign = in the place of (?).

8÷2= ? 15÷3= ? 20÷4= ? 25÷5= ?
10÷2= ? 10÷5= ? 5÷5= ? 20÷5= ?

LESSON XLII.

1. Among how many boys can 15 cents be divided and each boy receive 5 cents?

2. There are two ways of solving this example:

FIRST.—Taking 5 cents from 15 cents, 10 cents are left; again, taking 5 cents from 10 cents, 5 cents are left; again, taking 5 cents from 5 cents, no cents are left. Since 5 cents have been subtracted or taken from 15 cents 3 *times*, I gave the 15 cents to 3 boys.

SECOND.—Since we wish to find how many times 5 cents are contained in 15 cents, write the expression thus, $15 \div 5 = 3$, and read it, 15 *divided by* 5 *equals* 3. Or, write 15, and on the left write 5, with a short curved line between them, and a short line under the 15. Then say, 5 *is contained* in 15, 3 *times*, and write the result below the line.

FIRST.

By Subtraction.

$$\begin{array}{r l} 15 & \text{cents.} \\ \underline{5} & \\ 10 & \text{cents.} \\ \underline{5} & \\ 5 & \text{cents.} \\ \underline{5} & \\ 0 & \text{cents.} \end{array}$$

SECOND.

By Division.

$$\begin{array}{r} 5\overline{)15} \\ \hline 3 \end{array}$$

3. The result is 3 in both cases, but in the first case it is obtained by *Subtraction*, in the second case by *Division*. Hence, *Division* is also a short method of performing several *subtractions* of the *same number*.

4. Find the result, both by Subtraction and by Division of each of the following:

How many

5. 3's in 12?

6. 4's in 16?

7. 4's in 20?

8. 3's in 15?

9. 5's in 20?

10. 5's in 25?

LESSON XLIII.

1. How many times 2 cents in 10 cents? In 12 cents?

2. How many times 3 days in 12 days? In 15 days?

3. How many times 4 plums in 12 plums? In 16 plums?

4. How many times 5 hours in 15 hours? In 20 hours?

5. At 5 cents each, how many toys can be bought for 20 cents?

Solution.—As many toys as 5 cents are contained times in 20 cents, which are 4 times. Hence 4 toys can be bought for 20 cents.

6. At 2 cents each, how many pears can be bought for 10 cents?

7. How many quarts of milk at 4 cents a quart, can be bought for 16 cents?

8. If 1 lemon cost 3 cents, how many lemons can be bought for 15 cents?

9. To how many boys can you give 12 apples, if you give them 4 apples apiece?

10. How many hats can be bought for 25 dollars, at 5 dollars apiece?

11. Ella paid 20 cents for some ribbon, at 5 cents a yard. How many yards did she buy?

12. Clarence gave 16 cents for some tops, at 4 cents a piece. How many tops did he buy?

Division at Sight.

8÷2= ?   8÷4= ?   15÷5= ?   15÷3= ?
6÷3= ?   10÷5= ?   10÷2= ?   16÷4= ?

4)20   5)25   4)16   5)20   3)15   2)12

LESSON XLIV.

EQUAL PARTS OF NUMBERS.

1. If 6 oranges are divided equally between 2 girls into how many *equal parts* are the oranges divided?

2. When a number is divided into 2 equal parts, what is one of the parts called? ***One-half*** of the number.

3. How many oranges are *one-half* of 6 oranges?

$6 \div 2 = 3$, or *one-half* of 6 is 3.

4. How many boys are one-half of 8 boys?

5. How many peaches are one-half of 10 peaches?

6. If you put 10 bushels of apples into 2 boxes, what part of the whole do you put into 1 box?

7. Instead of finding how many times one number is *contained in* another of the *same* kind, it is sometimes required to divide a number into *equal parts.* The operation in both cases is the same, but the reasoning is somewhat different. Thus,

8. At 3 cents each, how many pears can be bought for 6 cents?

SOLUTION.—As many pears as 3 cents are contained times in 6 cents, which are 2 *times.* Hence 2 pears can be bought for 6 cents. $6 \div 3 = 2$.

9. Again, if 2 pears cost 6 cents, what will 1 pear cost?

SOLUTION.—If 2 pears cost 6 cents, 1 pear will cost *one-half* of *6 cents,* which is 3 cents. $6 \div 2 = 3$.

10. If 12 cherries are divided equally among 3 boys, into how many *equal parts* are they divided?

11. When a number is divided into 3 equal parts, what is one of the parts called? ***One-third*** of the number.

12. How many cherries are *one-third* of 12 cherries?

12 ÷ 3 = 4, or *one-third* of 12 is 4.

13. How many cents are one-third of 9 cents?

14. How many marbles are one-third of 15 marbles?

15. If 12 pinks grow upon 4 stems, each containing an equal number, how many grow upon each stem?

16. When a number is divided into 4 equal parts, what is one of the parts called? ***One-fourth*** of the number.

17. How many pinks are *one-fourth* of 12 pinks?

12 ÷ 4 = 3, or *one-fourth* of 12 is 3.

18. How many dollars are one-fourth of 8 dollars?

19. What is one-fourth of 12? Of 16? Of 20?

20. When a number is divided into 5 equal parts, what is one of the parts called? ***One-fifth*** of the number.

21. How many balls are *one-fifth* of 20 balls?

20 ÷ 5 = 4, or *one-fifth* of 20.

22. How many cents are one-fifth of 15 cents?

LESSON XLV.

1. *One-half* is written thus, $\frac{1}{2}$. $\frac{1}{2}$ of 6 is $6 \div 2 = 3$.

2. *One-third* is written $\frac{1}{3}$. $\frac{1}{3}$ of 6 is $6 \div 3 = 2$.

3. *One-fourth* is written $\frac{1}{4}$. $\frac{1}{4}$ of 8 is $8 \div 4 = 2$.

4. *One-fifth* is written $\frac{1}{5}$. $\frac{1}{5}$ of 15 is $15 \div 5 = 3$.

5. How many *halves* in any thing? How many *thirds* in any thing? How many *fourths* in any thing? How many *fifths* in any thing?

6. What is $\frac{1}{2}$ of 4 books? $\frac{1}{2}$ of 10 miles? $\frac{1}{2}$ of 8 houses?

7. What is $\frac{1}{3}$ of 6 sheep? $\frac{1}{3}$ of 9 weeks? $\frac{1}{3}$ of 12 dollars?

8. What is $\frac{1}{4}$ of 4 men? $\frac{1}{4}$ of 16 pounds? $\frac{1}{4}$ of 20 chairs?

9. What is $\frac{1}{5}$ of 10 barrels? $\frac{1}{5}$ of 15 trees? $\frac{1}{5}$ of 25 dollars?

10. How do you obtain one-half of a number? One-third of a number? One-fourth of a number? One-fifth of a number?

11. If 20 marbles be divided equally among 4 boys, how many marbles will each boy receive?

SOLUTION.—Since 20 marbles are divided equally among 4 boys, one boy will receive *one-fourth* of 20 marbles, or 5 marbles.

12. If 3 books cost 15 cents, what is the cost of 1 book?

13. Write on your slates, in a column, all the numbers from 10 to 20. Read them.

14. Write the numbers from 20 to 30, and read them.

15. Write the numbers from 30 to 40, and read them.

16. In a similar manner write and read the numbers from 40 to 50. From 50 to 60. From 60 to 70. From 70 to 80. From 80 to 90. From 90 to 100.

17. How many figures are required in writing each number from 9 to 99?

LESSON XLVI.

1. How many are 5 and 1? 3 and 3? 4 and 2?

2. How many are 6 and 6 more? 12 and 6 more?

3. How many are 18 and 6? 24 and 6?

4. How many are three 6's? Four 6's? Five 6's?

5. Count by 6's to 12. To 18. To 24. To 30.

6. How many are 30 less 6? 24 less 6? 18 less 6? 12 less 6? 6 less 6?

7. Begin with 1 and count by 6's to 13. To 19. To 25.

8. Begin with 2 and count by 6's to 20. To 26. To 32.

9. How many are

6 + 6 + 6?	4 + 6 + 6?	2 + 6 + 6?
5 + 6 + 6?	3 + 6 + 6?	1 + 6 + 6?

10. How many are

18 — 6?	15 — 6?	9 — 6?	8 — 6?
12 — 6?	11 — 6?	13 — 6?	6 — 6?

11. How many are

3 times 6?	4 times 6?	6 × 5?	3 × 6?
5 times 6?	2 times 6?	1 × 6?	6 × 6?

12. How many

6's in 18?	6's in 30?	4's in 16?
6's in 24?	5's in 20?	5's in 25?

EXERCISES FOR THE SLATE AND BOARD.

13. Copy and add or count the following:

6	6	6	6	6	6	6	5	4	2
6	6	6	6	6	6	5	6	6	4
6	6	6	6	6	6	4	3	5	6
6	5	4	3	2	1	2	4	3	5

LESSON XLVII.

1. If 18 figs are equally divided among 6 boys, into how many *equal parts* are the figs divided?

2. When a number is divided into 6 equal parts, what is one of the parts called? ***One-sixth*** of the number.

3. How many figs are *one-sixth* of 24 figs?

⌘ ⌘ ⌘ ⌘ ⌘ ⌘

$24 \div 6 = 4$, or *one-sixth* of 24 is 4.

4. If 24 plants are set in 6 equal rows, what part of 24 plants is set in 1 row? How many plants?

5. *One-sixth* is written thus, $\frac{1}{6}$. $\frac{1}{6}$ of 24 is $24 \div 6 = 4$.

TABLES.

ADDITION.	SUBTRACTION.	MULTIPLICATION.	DIVISION.
$0+6=6$	$6-6=0$	$6\times0=0$	$0\div6=0$
$1+6=7$	$7-6=1$	$6\times1=6$	$6\div6=1$
$2+6=8$	$8-6=2$	$6\times2=12$	$12\div6=2$
$3+6=9$	$9-6=3$	$6\times3=18$	$18\div6=3$
$4+6=10$	$10-6=4$	$6\times4=24$	$24\div6=4$
$5+6=11$	$11-6=5$	$6\times5=30$	$30\div6=5$
$6+6=12$	$12-6=6$	$6\times6=36$	$36\div6=6$

EQUAL PARTS OF NUMBERS.

$\frac{1}{6}$ of 6 = 1
$\frac{1}{6}$ of 12 = 2
$\frac{1}{6}$ of 18 = 3
$\frac{1}{6}$ of 24 = 4
$\frac{1}{6}$ of 30 = 5
$\frac{1}{6}$ of 36 = 6

When the regular form of each table has been thoroughly learned, require the pupil to reverse the *order* of the numbers; thus, in Addition, for $2+6=8$, say $6+2=8$; in Subtraction, for $8-6=2$, say $8-2=6$; in Multiplication, for $6\times2=12$, say $2\times6=12$; *and in Division*, for $12\div6=2$, say $12\div2=6$, etc.

LESSON XLVIII.

1. If a man have 18 dollars, and he earn 6 more, how many dollars will he then have? 18 + 6 = ?

2. A man having 18 dollars gave 6 dollars for a barrel of flour. How many dollars had he left? 18 − 6 = ?

3. A laborer received 3 dollars a day for 6 days work. How many dollars did he receive in all? 3 × 6 = ?

4. At 3 dollars apiece, how many chairs can be bought for 18 dollars? 18 ÷ 6 = ?

EXERCISES FOR THE SLATE AND BOARD.

5. Write the proper numbers in place of (?):

10 + 6 = ?	13 + 6 = ?	15 + 6 = ?	23 + 6 = ?
10 − 6 = ?	13 − 6 = ?	15 − 6 = ?	22 − 6 = ?
4 × 6 = ?	5 × 6 = ?	3 × 6 = ?	6 × 6 = ?
12 ÷ 6 = ?	18 ÷ 6 = ?	30 ÷ 6 = ?	36 ÷ 6 = ?

Addition.

3	4	4	4	3	6	4	3	4	6
4	5	6	4	5	4	3	4	3	4
6	3	5	5	6	4	5	6	5	3

Subtraction.

9	10	12	10	7	12	11	10	13	9
2	6	8	5	3	6	5	4	7	3

Multiplication.

6	3	5	6	4	4	5	6	6	6
4	6	5	5	6	4	6	3	4	6

Division.

6)24 5)25 4)16 6)18 4)24 6)36

LESSON XLIX.

1. How many are 3 and 4? 4 and 3? 5 and 2?

2. How many are 7 and 1? 7 and 2? 7 and 3?

3. How many are 7 and 5? 7 and 6? 7 and 7?

4. How many are 14 and 7 more? 14+7= ?

5. Count 21 by 3's. Count 21 by 7's.

6. How many are 21 and 7 more? 21+7= ?

7. Count 28 by 2's. Count 28 by 4's. Count 28 by 7's.

8. Count 35 by 5's. Count 35 by 7's.

9. How many are 35 less 7? 28 less 7? 21 less 7?

10. How many are 35 and 7 more? 42 and 7 more?

11. Count 42 by 2's. By 3's. By 6's. By 7's.

12. How many are

7+7+7? 7+7+7+7? 7+7+7+7+7?

13. How many are

35—7? 28—7? 21—7? 14—7? 7—7?

14. How many are

7×2? 7×3? 7×4? 7×5 7×6?

15. How many

7's in 21? 7's in 28? 7's in 35? 7's in 42?

EXERCISES FOR THE SLATE AND BOARD.

16. Copy and add or count the following:

7	7	7	7	7	7	7	7	5	6
7	7	7	7	7	7	7	6	7	2
7	6	5	4	3	2	1	1	3	7

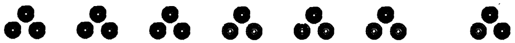
When the pupil can rapidly and accurately add three figures in a column, the number of figures should be increased to four, then *five, then six,* and then to seven.

LESSON L.

1. If 21 yards of cloth are made into 7 coats of the same size, into how many *equal parts* must the 21 yards be cut?

2. When a number is divided into 7 equal parts, what is one of the parts called? ***One-seventh*** of the number.

3. How many yards are *one-seventh* of 21 yards?



$21 \div 7 = 3$, or *one-seventh* of 21 is 3.

4. How many birds are one-seventh of 7 birds? Of 14 birds? Of 21 birds?

5. If 21 bushels of apples are put into 7 barrels, what part of the 21 bushels is put into 1 barrel? How many bushels?

6. *One-seventh* is written thus, $\frac{1}{7}$. $\frac{1}{7}$ of 28 is $28 \div 7 = 4$.

TABLES.

ADDITION.

0+7=7
1+7=8
2+7=9
3+7=10
4+7=11
5+7=12
6+7=13
7+7=14
8+7=15

SUBTRACTION.

7−7=0
8−7=1
9−7=2
10−7=3
11−7=4
12−7=5
13−7=6
14−7=7
15−7=8

MULTIPLICATION.

7×0= 0
7×1= 7
7×2=14
7×3=21
7×4=28
7×5=35
7×6=42
7×7=49
7×8=56

LESSON LI.

TABLES—*Continued.*

DIVISION.

$0 \div 7 = 0$
$7 \div 7 = 1$
$14 \div 7 = 2$
$21 \div 7 = 3$
$28 \div 7 = 4$
$35 \div 7 = 5$
$42 \div 7 = 6$
$49 \div 7 = 7$
$56 \div 7 = 8$

EQUAL PARTS OF NUMBERS.

$\frac{1}{7}$ of $0 = 0$
$\frac{1}{7}$ of $7 = 1$
$\frac{1}{7}$ of $14 = 2$
$\frac{1}{7}$ of $21 = 3$
$\frac{1}{7}$ of $28 = 4$
$\frac{1}{7}$ of $35 = 5$
$\frac{1}{7}$ of $42 = 6$
$\frac{1}{7}$ of $49 = 7$
$\frac{1}{7}$ of $56 = 8$

How many are

7 times 5 boys?
3 times 7 pears?
7 times 6 hats?
5 times 7 coats?
7 times 7 cents?
4 times 7 horses?

How many are

$\frac{1}{7}$ of 14 roses?
$\frac{1}{7}$ of 28 dollars?
$\frac{1}{7}$ of 21 pounds?
$\frac{1}{7}$ of 35 miles?
$\frac{1}{7}$ of 42 oranges?
$\frac{1}{7}$ of 49 days?

Addition at Sight.

4	6	5	7	7	7	3	0	7	7
7	7	7	3	6	7	7	7	5	4

Subtraction at Sight.

7	10	13	12	7	14	21	9	7	7
7	7	7	7	1	7	7	7	0	5

Multiplication at Sight.

7	2	6	7	4	7	7	7	5	7
3	7	7	5	7	2	4	6	7	7

LESSON LII.

1. John gave 5 cents for a pencil, 4 cents for a top, and had 2 cents left. How many cents had he in all?

2. There were 35 sheep in a lot and 7 jumped out. How many remained?

3. What will be the cost of 6 papers of needles, at 7 cents a paper?

4. How many pounds of rice can be bought for 42 cents, at 7 cents a pound?

EXERCISES FOR THE SLATE AND BOARD.

5. Write the proper numbers in place of (?).

21+7= ? 28+7= ? 14+7= ? 29+7= ?
21−7= ? 28−7= ? 42−7= ? 29−7= ?
3×7= ? 5×7= ? 6×7= ? 7×7= ?
21÷7— ? 28÷7= ? 35÷7= ? 42÷7= ?

Addition.

7	5	4	3	6	7	4	7	6	7
7	7	6	7	0	1	5	3	7	7
6	4	7	7	7	6	6	6	7	7

Subtraction.

9	10	11	7	14	13	12	17	11	12
7	6	7	2	7	7	6	6	6	5

Multiplication.

7	6	5	7	7	4	0	7	6	7
4	7	7	3	5	7	7	6	6	7

Division.

7)14 6)24 7)28 5)30 7)35 6)36 7)49

LESSON LIII.

1. How many are 7 and 1? 6 and 2? 5 and 3? 4 and 4?

2. How many are 8 and 5? 8 and 6? 8 and 7? 8 and 8?

3. Count 16 by 2's. By 4's. By 8's.

4. How many are 16 and 8 more? 16+8= ?

5. Count 24 by 2's. By 4's. By 6's. By 8's.

6. How many are 24 and 8 more? 24+8= ?

7. Count 32 by 2's. By 4's. By 8's.

8. How many 4's in 32? How many 8's?

9. How many are 32 less 8? 24 less 8? 16 less 8?

10. How many are 32 and 8 more? 32+8= ?

11. Count 40 by 2's. By 4's. By 5's. By 8's.

12. How many are 40 and 8 more? 48 and 8 more?

13. How many 8's in 40? How many 5's?

14. How many are

8+8+8? 8+8+8+8? 8+8+8+8+8?

15. How many are

40—8? 32—8? 24—8? 16—8? 8—8?

16. How many are

8×2? 8×3? 8×4? 8×5? 8×6? 8×7?

17. How many are

8÷8? 16÷8? 24÷8? 32÷8? 40÷8?

EXERCISES FOR THE SLATE AND BOARD.

18. Copy and add or count the following:

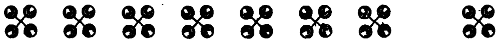
8	8	8	8	8	8	8	8	4	3
8	8	8	8	8	8	8	8	5	8
8	8	8	8	8	8	8	8	6	2
8	7	6	5	4	3	2	1	8	7

LESSON LIV.

1. If 32 pounds of tea are put into 8 boxes, an equal number of pounds into each box, into how many *equal parts* are the 32 pounds divided?

2. When a number is divided into 8 equal parts, what is one of the parts called? ***One-eighth*** of the number.

3. How many pounds are *one-eighth* of 32 pounds?



$32 \div 8 = 4$, or *one-eighth* of 32 is 4.

4. How many are one-eighth of 16 men? Of 24 men?

5. If 40 boys sit upon 8 benches, on each an equal number, what part of the 40 boys sit upon 1 bench? How many boys?

6. *One-eighth* is written thus, $\frac{1}{8}$. $\frac{1}{8}$ of 48 is $48 \div 8 = 6$.

TABLES.

ADDITION.

$0+8=8$
$1+8=9$
$2+8=10$
$3+8=11$
$4+8=12$
$5+8=13$
$6+8=14$
$7+8=15$
$8+8=16$

SUBTRACTION.

$8-8=0$
$9-8=1$
$10-8=2$
$11-8=3$
$12-8=4$
$13-8=5$
$14-8=6$
$15-8=7$
$16-8=8$

MULTIPLICATION.

$8 \times 0=0$
$8 \times 1=8$
$8 \times 2=16$
$8 \times 3=24$
$8 \times 4=32$
$8 \times 5=40$
$8 \times 6=48$
$8 \times 7=56$
$8 \times 8=64$

LESSON LV.

TABLES—*Continued.*

DIVISION.

$0 \div 8 = 0$
$8 \div 8 = 1$
$16 \div 8 = 2$
$24 \div 8 = 3$
$32 \div 8 = 4$
$40 \div 8 = 5$
$48 \div 8 = 6$
$56 \div 8 = 7$
$64 \div 8 = 8$

EQUAL PARTS.

$\frac{1}{8}$ of 0 = 0
$\frac{1}{8}$ of 8 = 1
$\frac{1}{8}$ of 16 = 2
$\frac{1}{8}$ of 24 = 3
$\frac{1}{8}$ of 32 = 4
$\frac{1}{8}$ of 40 = 5
$\frac{1}{8}$ of 48 = 6
$\frac{1}{8}$ of 56 = 7
$\frac{1}{8}$ of 64 = 8

How many are

8 times 3 eggs?
5 times 8 nuts?
8 times 4 pins?
6 times 8 hours?
8 times 8 cents?
7 times 8 quarts?

How many are

$\frac{1}{8}$ of 24 miles?
$\frac{1}{8}$ of 16 dollars?
$\frac{1}{8}$ of 32 ounces?
$\frac{1}{8}$ of 48 men?
$\frac{1}{8}$ of 56 bushels?
$\frac{1}{8}$ of 40 cents?

Addition at Sight.

8	8	5	8	4	7	3	8	6	8
6	7	8	8	8	8	8	5	8	4

Subtraction at Sight.

8	10	12	16	9	8	8	24	14	11
8	8	8	8	8	3	1	8	8	8

LESSON LVI.

1. Robert found 16 ripe peaches under a tree; he ate 3 and gave away 5. How many had he left?

2. George had 24 cents, which was 8 more than Ella had. How many cents had Ella?

3. At 8 cents each, what is the cost of 6 writing-books?

4. At 8 cents a yard, how many yards of ribbon can be bought for 48 cents?

EXERCISES FOR THE SLATE AND BOARD.

5. Write the proper numbers in place of (?):

16+8= ?   15+8= ?   32+8= ?   22+8= ?
16−8= ?   15−8= ?   32−8= ?   22−8= ?
7×8= ?   5×8= ?   8×8= ?   6×8= ?
24÷8= ?   40÷8= ?   48÷8= ?   56÷8= ?

Addition.

8	7	5	6	4	4	8	8	8	7
5	1	8	8	0	6	3	6	8	7
3	4	6	8	8	7	2	7	8	8

Subtraction.

9	11	12	8	16	14	24	15	12	10
8	6	8	2	8	7	8	7	6	2

Multiplication.

8	7	6	5	4	8	7	7	8	8
3	5	4	8	7	6	6	7	7	8

Division.

6)18   8)56   8)40   7)49   6)48

LESSON LVII.

1. How many are 8 and 1? 7 and 2? 6 and 3? 5 and 4?

2. How many are 9 and 7? 9 and 8? 9 and 9?

3. Count 18 by 2's. By 3's. By 6's. By 9's.

4. Count 27 by 3's. Count 27 by 9's.

5. How many 3's in 27? How many 9's in 27?

6. How many are 27 less 9? 18 less 9? 9 less 9?

7. Count 36 by 2's. By 3's. By 4's. By 6's. By 9's.

8. How many are 36 less 9? 27 less 9? 18 less 9?

9. Count 45 by 3's. By 5's. By 9's.

10. How many 5's in 45? How many 9's?

11. How many are 45 and 9 more? 45+9= ?

12. How many are 54 and 9 more? 54+9= ?

13. Count 63 by 3's. By 7's. by 9's.

14. How many 7's in 63? How many 9's?

15. How many are

9+9+9? 9+9+9+9? 9+9+9+9+9?

16. How many are

63—9? 54—9? 45—9? 36—9? 18—9?

17. How many are

9×3? 9×4? 9×5? 9×6? 9×7?

18. How many are

18÷9? 27÷9? 36÷9? 45÷9? 54÷9? 63÷9?

EXERCISES FOR THE SLATE AND BOARD.

19. Copy and add or count the following:

9	9	9	9	9	9	9	9	9	9
9	9	9	9	9	9	9	9	9	9
9	8	7	6	5	4	3	2	1	0

LESSON LVIII.

1. If 45 trees are set in 9 rows, an equal number in each row, into how many *equal parts* are the 45 trees divided?

2. When a number is divided into 9 equal parts, what is one of the parts called? ***One-ninth*** of the number.

3. How many trees are *one-ninth* of 45 trees?

///// ///// ///// ///// ///// ///// ///// ///// /////

$45 \div 9 = 5$, or *one-ninth* of 45 is 5.

4. How many rods are one-ninth of 9 rods? Of 18 rods? Of 36 rods?

5. If 27 bushels of grain be put into 9 bags of equal size, what part of the 27 bushels will 1 bag contain? How many bushels?

6. *One-ninth* is written thus, $\frac{1}{9}$. $\frac{1}{9}$ of 54 is $54 \div 9 = 6$.

TABLES.

ADDITION.

$1+9=10$
$2+9=11$
$3+9=12$
$4+9=13$
$5+9=14$
$6+9=15$
$7+9=16$
$8+9=17$
$9+9=18$

SUBTRACTION.

$10-9=1$
$11-9=2$
$12-9=3$
$13-9=4$
$14-9=5$
$15-9=6$
$16-9=7$
$17-9=8$
$18-9=9$

MULTIPLICATION.

$9 \times 1 = 9$
$9 \times 2 = 18$
$9 \times 3 = 27$
$9 \times 4 = 36$
$9 \times 5 = 45$
$9 \times 6 = 54$
$9 \times 7 = 63$
$9 \times 8 = 72$
$9 \times 9 = 81$

LESSON LIX.

TABLES—*Continued.*

DIVISION.

9÷9=1
18÷9=2
27÷9=3
36÷9=4
45÷9=5
54÷9=6
63÷9=7
72÷9=8
81÷9=9

EQUAL PARTS.

$\frac{1}{9}$ of 9=1
$\frac{1}{9}$ of 18=2
$\frac{1}{9}$ of 27=3
$\frac{1}{9}$ of 36=4
$\frac{1}{9}$ of 45=5
$\frac{1}{9}$ of 54=6
$\frac{1}{9}$ of 63=7
$\frac{1}{9}$ of 72=8
$\frac{1}{9}$ of 81=9

How many are

9 times 4 balls ?
6 times 9 boxes ?
9 times 5 hens ?
8 times 9 miles ?
9 times 7 feet ?
9 times 9 cents ?

How many are

$\frac{1}{9}$ of 27 sheep ?
$\frac{1}{9}$ of 36 acres ?
$\frac{1}{9}$ of 54 boys ?
$\frac{1}{9}$ of 63 gallons ?
$\frac{1}{9}$ of 72 girls ?
$\frac{1}{9}$ of 81 marbles ?

Addition at Sight.

9	9	7	8	4	9	9	9	5	9
5	6	9	9	9	3	7	8	9	9

Subtraction at Sight.

10	9	11	12	9	18	27	26	14	15
9	7	8	9	4	9	9	9	9	9

In all the foregoing tables, the pupil should be required to invert the order of the numbers, and to repeat them backward and promiscuously until they are thoroughly memorized.

LESSON LX.

1. In a garden are 18 pear trees and 9 peach trees. How many of both? How many more pear trees than peach trees?

2. There are 6 peaches on each tree. How many peaches on the 9 trees?

3. At 9 cents a pound, how many pounds of sugar can be bought for 45 cents? For 54 cents? For 27 cents?

4. How many are one-ninth of 18 books? Of 36 melons?

EXERCISES FOR THE SLATE AND BOARD.

5. Write the proper numbers in place of (?).

$27+9=?$
$27-9=?$
$3\times9=?$
$27\div9=?$

$36+9=?$
$36-9=?$
$5\times9=?$
$45\div9=?$

$63+9=?$
$63-9=?$
$8\times9=?$
$72\div9=?$

Addition.

7	8	7	9	9	8	9	6	8	9
3	2	9	5	9	7	3	6	8	9
9	9	4	2	4	9	9	8	8	9

Subtraction.

12	15	9	16	18	27	29	17	16	9
9	9	2	9	9	9	9	8	7	9

Multiplication.

7	8	9	6	7	9	8	8	9	9
8	6	5	9	8	7	9	8	6	9

Division.

9)27 6)54 9)63 9)72 9)81 7)63

LESSON LXI.

1. How many are 9 and 1? 7 and 3? 6 and 4? 5 and 5?

2. How many are 10 and 5? 10 and 7? 10 and 8?

3. Count by 2's to 20. By 4's. By 5's. By 10's.

4. How many 2's in 20? How many 4's? 5's? 10's?

5. How many are 20 and 10 more? $20+10=$?

6. How many are 30 and 10? 40 and 10? 50 and 10?

7. How many 10's in 30? In 40? In 50? In 60?

8. Count 40 by 2's. By 4's. By 5's. By 8's. By 10's.

9. Count by 10's

From 1 to 91.
From 2 to 92.
From 3 to 93.
From 4 to 94.
From 5 to 95.
From 6 to 96.
From 7 to 97.
From 8 to 98.
From 9 to 99.
From 0 to 100.

10. How many are

$10+10+10+10$? $10+10+10+10+10$?

11. How many are

$100-10$? $90-10$? $70-10$? $40-10$?

12. How many are

10×5? 10×7? 10×6? 10×8? 10×10?

13. How many are

$40\div10$? $50\div10$? $70\div10$? $80\div10$? $90\div10$?

14. When a number is divided into 10 equal parts, what is one of the parts called? ***One-tenth*** of the number.

15. How many barrels are *one-tenth* of 70 barrels?

$70 \div 10 = 7$, or *one-tenth* of 70 is 7.

16. How many sheep are one-tenth of 80 sheep?

17. *One-tenth* is written thus, $\frac{1}{10}$. $\frac{1}{10}$ of 90 is $90\div10=9$.

LESSON LXII.

Tables.

Addition.

$0+10=10$
$1+10=11$
$2+10=12$
$3+10=13$
$4+10=14$
$5+10=15$
$6+10=16$
$7+10=17$
$8+10=18$
$9+10=19$
$10+10=20$
$11+10=21$

Subtraction.

$10-10=0$
$11-10=1$
$12-10=2$
$13-10=3$
$14-10=4$
$15-10=5$
$16-10=6$
$17-10=7$
$18-10=8$
$19-10=9$
$20-10=10$
$21-10=11$

Multiplication.

$10\times0=0$
$10\times1=10$
$10\times2=20$
$10\times3=30$
$10\times4=40$
$10\times5=50$
$10\times6=60$
$10\times7=70$
$10\times8=80$
$10\times9=90$
$10\times10=100$
$10\times11=110$

Division.

$0\div10=0$
$10\div10=1$
$20\div10=2$
$30\div10=3$
$40\div10=4$
$50\div10=5$
$60\div10=6$
$70\div10=7$
$80\div10=8$
$90\div10=9$
$100\div10=10$

Equal Parts.

$\frac{1}{10}$ of $0=0$
$\frac{1}{10}$ of $10=1$
$\frac{1}{10}$ of $20=2$
$\frac{1}{10}$ of $30=3$
$\frac{1}{10}$ of $40=4$
$\frac{1}{10}$ of $50=5$
$\frac{1}{10}$ of $60=6$
$\frac{1}{10}$ of $70=7$
$\frac{1}{10}$ of $80=8$
$\frac{1}{10}$ of $90=9$
$\frac{1}{10}$ of $100=10$

LESSON LXIII.

1. How many are 10 and 1? 8 and 3? 9 and 2? 7 and 4? 6 and 5?

2. How many are 11 and 4? 11 and 6? 11 and 9?

3. How many are 11 and 7? 11 and 10? 11 and 11?

4. Count by 2's to 22. How many 2's in 22? How many 11's in 22?

5. How many are 22 and 11 more? 22+11= ?

6. How many are 33 and 11 more? 33+11= ?

7. How many are 44 and 11 more? 55 and 11?

8. How many 11's in 33? In 44? In 55? In 66?

9. Count 44 by 2's. By 4's. By 11's.

10. How many are 66+11? 77+11? 88+11? 99+11?

11. How many are
99−11? 88−11? 77−11? 66−11? 77−11?

12. How many are
11×2? 11×3? 11×4? 11×5? 11×6? 11×7?

13. How many are
88÷11? 77÷11? 66÷11? 55÷11? 44÷11?

14. When a number is divided into 11 equal parts, what is one of the parts called?

One-eleventh of the number.

15. How many boys are *one-eleventh* of 44 boys?
44 ÷ 11 = 4, or *one-eleventh* of 44 is 4.

16. How many days are one-eleventh of 55 days?

17. *One-eleventh* is written thus, $\frac{1}{11}$. $\frac{1}{11}$ of 66 is 66÷11=6.

18. If 88 cents are divided among 11 boys, what part *of the whole does* each boy receive? How many cents?

LESSON LXIV.

TABLES.

ADDITION.

0+11=11
1+11=12
2+11=13
3+11=14
4+11=15
5+11=16
6+11=17
7+11=18
8+11=19
9+11=20
10+11=21
11+11=22

SUBTRACTION.

11−11=0
12−11=1
13−11=2
14−11=3
15−11=4
16−11=5
17−11=6
18−11=7
19−11= 8
20−11= 9
21−11=10
22−11=11

MULTIPLICATION.

11×0= 0
11×1=11
11×2=22
11×3=33
11×4=44
11×5=55
11×6=66
11×7=77
11× 8= 88
11× 9= 99
11×10=110
11×11=121

DIVISION.

0÷11=0
11÷11=1
22÷11=2
33÷11=3
44÷11=4
55÷11=5
66÷11=6
77÷11=7
88÷11= 8
99÷11= 9
110÷11=10
121÷11=11

EQUAL PARTS.

$\frac{1}{11}$ of 0=0
$\frac{1}{11}$ of 11=1
$\frac{1}{11}$ of 22=2
$\frac{1}{11}$ of 33=3
$\frac{1}{11}$ of 44=4
$\frac{1}{11}$ of 55=5
$\frac{1}{11}$ of 66=6
$\frac{1}{11}$ of 77=7
$\frac{1}{11}$ of 88= 8
$\frac{1}{11}$ of 99= 9
$\frac{1}{11}$ of 110=10
$\frac{1}{11}$ of 121=11

LESSON LXV.

1. How many are 11 and 1? 8 and 4? 9 and 3?

2. What numbers multiplied together will produce 12?

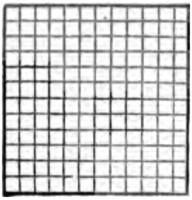
3. How many are 12 and 4? 12 and 6? 12 and 8?

4. How many are 12 and 9? 12 and 10? 12 and 12?

5. Count by 2's to 24. By 4's. By 6's. By 8's. By 12's.

6. How many are 24 and 12 more? $24+12=$?

7. How many are 36 and 12 more? $36+12=$?



8. How many squares in one row? How many 12's?

9. How many squares in two rows? How many 12's?

10. How many squares in three rows? How many 12's?

11. How many squares in 4 rows?

12. In 5? In 6? In 7? In 8? In 10? In 11? In 12?

13. What is $\frac{1}{2}$ of 12? $\frac{1}{3}$ of 12? $\frac{1}{4}$ of 12? $\frac{1}{6}$ of 12?

14. How many 12's in 24? In 36? In 48? In 60?

15. Count 60 by 3's. By 5's. By 6's. by 10's. By 12's.

How many are

16. $36+12$? $48+12$? $60+12$? $72+12$? $84+12$?

17. $96-12$? $84-12$? $72-12$? $60-12$? $48-12$?

18. 12×2? 12×3? 12×4? 12×5? 12×6?

19. How many are $24\div12$? $36\div12$? $48\div12$? $60\div12$?

20. When a number is divided into 12 equal parts, what is one of the parts called? ***One-twelfth*** of the number.

21. How many eggs are *one-twelfth* of 60 eggs?

$60\div12=5$, or *one-twelfth* of 60 is 5.

22. *One-twelfth* is written $\frac{1}{12}$. $\frac{1}{12}$ of 72 is $72\div12=6$.

LESSON LXVI.

TABLES.

ADDITION.

$1+12=13$
$2+12=14$
$3+12=15$
$4+12=16$
$5+12=17$
$6+12=18$
$7+12=19$
$8+12=20$
$9+12=21$
$10+12=22$
$11+12=23$
$12+12=24$

SUBTRACTION.

$13-12=1$
$14-12=2$
$15-12=3$
$16-12=4$
$17-12=5$
$18-12=6$
$19-12=7$
$20-12=8$
$21-12=9$
$22-12=10$
$23-12=11$
$24-12=12$

MULTIPLICATION.

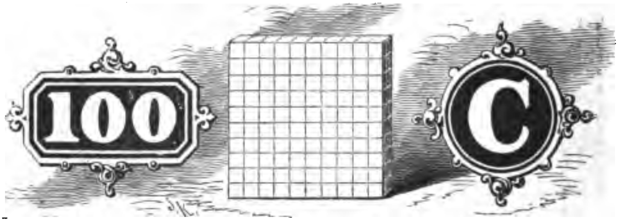
$12\times 1=12$
$12\times 2=24$
$12\times 3=36$
$12\times 4=48$
$12\times 5=60$
$12\times 6=72$
$12\times 7=84$
$12\times 8=96$
$12\times 9=108$
$12\times 10=120$
$12\times 11=132$
$12\times 12=144$

DIVISION.

$12\div 12=1$
$24\div 12=2$
$36\div 12=3$
$48\div 12=4$
$60\div 12=5$
$72\div 12=6$
$84\div 12=7$
$96\div 12=8$
$108\div 12=9$
$120\div 12=10$
$132\div 12=11$
$144\div 12=12$

EQUAL PARTS.

$\frac{1}{12}$ of $12=1$
$\frac{1}{12}$ of $24=2$
$\frac{1}{12}$ of $36=3$
$\frac{1}{12}$ of $48=4$
$\frac{1}{12}$ of $60=5$
$\frac{1}{12}$ of $72=6$
$\frac{1}{12}$ of $84=7$
$\frac{1}{12}$ of $96=8$
$\frac{1}{12}$ of $108=9$
$\frac{1}{12}$ of $120=10$
$\frac{1}{12}$ of $132=11$
$\frac{1}{12}$ of $144=12$



ONE HUNDRED.

LESSON LXVII.

1. How many rows of blocks are shown in this picture?

2. How many blocks in each row? How many blocks in all?

3. Ten times 10 blocks are how many? $10 \times 10 = ?$

4. How many 10's in one hundred? How many units?

5. Count from 1 to 100 by 10's. From 5. From 7.

6. Write the figures that stand for one hundred. *100*

7. How then do we express one hundred in figures?

8. What does 1 denote when it stands alone?

9. What does it denote with *one* 0 on the right of it?

10. What does it denote with *two* 00 on the right of it?

11. Hence, we represent 2 tens or *twenty,* by 20; and

12. 20 tens or Two hundred, by 200.

13. 30 tens or Three hundred, by 300.

14. 40 tens or Four hundred, by 400.

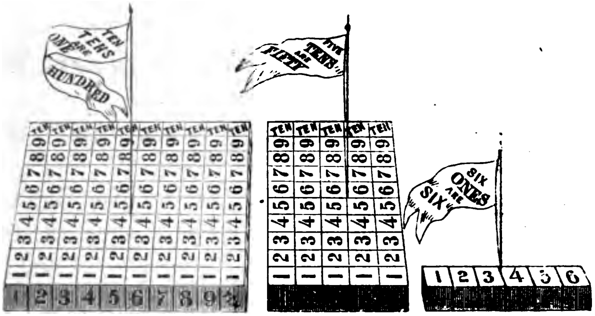
15. 50 tens or Five hundred, by 500.

16. 60 tens or Six hundred, by 600.

17. 70 tens or Seven hundred, by 700.

18. 80 tens or Eight hundred, by 800.

19. 90 tens or Nine hundred, by 900.



ONE HUNDRED and FIFTY- SIX. 156.

LESSON LXVIII.

1. Any figure standing alone is ***units;*** thus, 6 is 6 *units.*

2. When *two* figures are written together, the one on the right is *units,* the one on the left is ***tens;*** thus, 56 is 5 *tens* or fifty, and 6 *units,* and is read, *fifty-six.*

3. When *three* figures stand together, the one on the right is *units,* the next figure is *tens,* and the third on the left is ***hundreds;*** thus, 156 is 1 *hundred,* 5 *tens* and 6 *units,* read *one hundred fifty-six.*

4. What do the figures 243 denote?

Ans. 2 *hundreds,* 4 *tens,* and 3 *units,* and is read *two hundred forty-three.*

5. What do the figures 427 denote?

6. Copy and read the following, naming the *hundreds, tens,* and *units* in each.

341 184 537 782 872
462 265 673 394 935

LESSON LXIX.

1. How many *units* in 100? How many *tens?* How many *hundreds?*

2. How many *units* in 200? How many *tens?* How many *hundreds?*

3. How many *units* in 300? In 400? In 500? In 600?

4. How many *tens* in 300? In 400? In 500? In 600?

5. How many *hundreds* in 300? In 400? In 500?

6. How many *tens* in 210? In 220? In 340? In 450?

7. How many *units* in 225? How many *tens* and *units?* How many *hundreds, tens,* and *units?*

8. 10 units = 1 ten : 10 tens = 1 hundred.

9. When no number is named for any place, fill the place with a cipher; thus, seven hundred six is 7 hundred, *no* tens, and 6 units, and is written 706.

10. Seven hundred eighty is written 780.

11. Copy and read the following, naming the number of *hundreds, tens,* and *units* in each.

563 287 301 804 203
409 640 711 650 105

12. Write the following numbers in *figures,* and name the hundreds, tens, and units in each.

13. Seven hundred eight.

14. Five hundred sixty.

15. Three hundred eighty-seven.

16. One hundred ninety-five.

17. Eight hundred seven.

18. Six hundred fourteen.

19. Four hundred sixteen.

LESSON LXX.

1. In what place are units written? Tens? Hundred?

2. How many units make one ten?

3. How many tens make one hundred?

4. How many units are 7 tens and 9 units?

5. How many tens are 4 tens and 5 tens?

6. How many hundred are 3 hundred and 4 hundred? How many tens? How many units?

Express in one number, by figures, each of the following:

7. 4 tens, 6 units, and 5 hundred.
8. 5 units, 8 hundred, and 4 tens.
9. Six hundred, eight units, and five tens.
10. Seven tens, no hundreds, and six units.
11. Four units, no tens, and five hundred.
12. Nine tens, seven hundred, and no units.

Hund.	Tens.	Units.
5	4	6
8	4	5
6	5	8
0	7	6
5	0	4
7	9	0

Write the following numbers in columns, placing units under units, tens under tens, and hundreds under hundreds:

13. 366, 48, 104, 261, 407, 39, and 7.

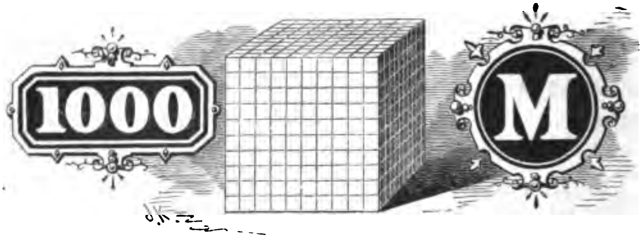
14. 59, 116, 204, 16, 320, 40, and 10.

15. What is the greatest number that can be expressed by *one* figure?

16. What is the greatest number that can be expressed by *two* figures?

17. The greatest number that can be expressed by *three* figures is 999.

18. 999 and 1 more equal **One thousand.**



ONE THOUSAND.

LESSON LXXI.

1. How many are 10 times 10?

2. In the picture there are 100 small blocks in the top row or layer. How many hundred blocks are there in 2 rows or layers?

3. How many hundred blocks in 3 rows? In 4 rows?

4. How many in 5 rows? In 6 rows? In 7 rows? In 8 rows? In 9 rows? In 10 rows?

5. Ten hundred equals ***one thousand.***

6. One thousand is written thus : *1,000*

7. What does 1 with *three* 000's on the right denote?

8. In like manner are represented,

Two thousand, by	2,000.	Six thousand, by	6,000.
Three thousand, by	3,000.	Seven thousand, by	7,000.
Four thousand, by	4,000.	Eight thousand, by	8,000.
Five thousand, by	5,000.	Nine thousand, by	9,000.

9. In any number expressed by *four* figures, the figure at the right is *units,* the next is *tens,* the next *hundreds,* and the fourth figure from the right is ***thousands.***

Thus, 2345, is 2 *thousands,* 3 *hundreds,* 4 *tens,* 5 *units,* and is read *two thousand three hundred forty-five.*

LESSON LXXII.

1. What do the figures 1040 denote?

Ans. 1 thousand, *no* hundreds, 4 tens, and *no* units, and is read *one thousand forty.*

2. In the same manner copy and read the following:

2406 4051 3007 1904
1572 5200 3333 6070

Write in figures the following numbers:

3. Three thousand five hundred seven.
4. One thousand two hundred ten.
5. Two thousand one hundred three.
6. Four thousand thirty.
7. Five thousand forty-six.
8. Seven hundred eight.
9. Five hundred ninety.

Thous.	Hund.	Tens.	Units.
3	5	0	7
1	2	1	0
2	1	0	3
4	0	3	0
5	0	4	6
	7	0	8
	5	9	0

10. The greatest number that can be expressed by four figures is 9999.

11. 9999 and 1 more equal ***ten thousand.*** 10,000

12. What does 1 with *four* 0000's at the right denote?

In like manner are represented,

13. 2 ten-thousands, or twenty thousand, by 20,000.
14. 3 ten-thousands, or thirty thousand, by 30,000.
15. 9 ten-thousands, or ninety thousand, by 90,000, etc.
16. 10 units make 1 ten.
17. 10 tens " 1 hundred.
18. 10 hundred " 1 thousand.
19. 10 thousand " 1 ten-thousand.
20. 10 ten-thousands " 1 ***hundred thousand.***

100,000

LESSON LXXIII.

1. It has been shown that the same figure has a different *value,* according to its place from the right; thus, 6 is 6 *units,* 60 is 6 *tens,* 600 is 6 *hundreds,* etc.

2. The different places are sometimes called ***orders*** of units; thus, 324 represents 4 units of the *first* order, 2 units of the *second* order, or 2 tens, and 3 units of the *third* order, or 3 hundreds.

3. The different orders of units are grouped into ***periods*** of 3 figures each.

4. The first group on the right is called the *period of units,* the second, the *period of thousands,* the third, the *period of millions,* as shown in the following

TABLE.

PERIODS.	3d.			2d.			1st.		
NAME.	Mill.			Thous.			Units.		
ORDERS OF UNITS.	Hund.	Tens	Units	Hund.	Tens	Units	Hund.	Tens	Units
NUMBER.	1	2	7,	3	6	4,	5	4	9

5. This number is read one hundred and twenty-seven *million,* three hundred and sixty-four *thousand,* five hundred forty-nine.

Each *period* is read like a number of *three* figures, giving it the *name* of the period; thus, 120, 120, 120 is *120 million,* 120 *thousand,* 120.

LESSON LXXIV.

Mill.			Thou.			Units.		
H.	T.	U.	H.	T.	U.	H.	T.	U.
						3	0	7
					2	4	6	0
				1	4	0	8	4
			2	0	5	6	0	2
		2	0	4	0	7	0	0

To assist the pupil in learning to write and to read numbers readily, he may be required to prepare on slate or paper, or on the blackboard, exercises similar to the following.

1. The first number is read, 3 hundred 7.

2. The second is read, 2 thousand 4 hundred 60.

3. The third is read, 14 thousand 84.

4. The fourth is read, 205 thousand 6 hundred 2.

5. The 5th is read, 2 million 40 thousand 7 hundred.

When proficiency in smaller numbers is attained, this exercise may be extended to higher periods.

Copy, point off into periods, and read the following:

6. 3472; 5060; 17043; 20304; 600317; 108300.

7. 500037; 2405037; 910307; 76301; 30406.

8. Write the preceding numbers in columns, placing units under units, tens under tens, etc.

Write in figures, arrange in columns, point off and read,

9. Nine thousand five hundred twelve; twenty-two thousand nine hundred forty; sixty thousand four hundred eight; ten thousand one hundred fifteen.

10. One hundred twenty-five thousand three hundred eleven; three hundred seven thousand five hundred four; five hundred and eleven thousand fifteen.

ADDITION

LESSON LXXV.

1. How many are 7 hats and 5 hats? 6 boys and 7 boys? 8 men + 9 men? 9 units + 7 units?

2. Can you add 6 books and 4 dollars?

3. Why not? *Ans.* Only numbers representing things of the *same kind* can be added.

4. How many units in 9 tens? In 7 tens? In 8 tens?

5. How many tens are 7 tens and 5 tens? How many units?

6. How many hundreds are 2 hundred and 6 hundred? How many tens? How many units?

7. How many tens are 10 units? 30 units? 50 units?

8. How many hundreds are 10 tens? 20 tens? 40 tens?

Exercises for the Slate and Board.

1. What is the sum of 34 and 53?

Numbers to be added, $\left\{\begin{array}{l} 34 = 3 \text{ tens } 4 \text{ units.} \\ \underline{53} = \underline{5 \text{ tens } 3} \text{ units.} \end{array}\right.$

Sum, $87 = 8 \text{ tens } 7 \text{ units.}$

Each of these numbers is made up of tens and units. Adding each, the sum is 8 tens and 7 units, or 87 units.

In similar manner add the following:

(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)	(*7.*)	(*8.*)
23	44	52	17	26	75	18
55	32	27	71	52	23	60

LESSON LXXVI.

1. I paid 7 dollars for a hat and 9 dollars for a vest; how many dollars did I pay for both?

Analysis.—I paid the *sum* of 7 dollars and 9 dollars, which is 16 dollars.

2. A farmer sold a sheep for 6 dollars and a calf for 8 dollars; what did he receive for both?

3. A boy had 16 marbles and his mother gave him 5 more; how many marbles had he then?

4. James paid 6 cents for a pencil, 5 cents for an orange, and 8 cents for a ball; what did he pay for all?

Find the sum of

5. 9, 7, and 2.
6. 5, 8, and 4.
7. 16, 4, and 7.
8. 8, 5, and 7.
9. 15, 5, and 8.
10. 21, 7, and 5.
11. 9, 10, and 6.
12. 8, 9, and 10.
13. 18, 6, and 7.

Exercises for the Slate and Board.

1. What is the sum of 324, 213, and 431?

Numbers to be added,
3 2 4 = 3 hunds. 2 tens 4 units.
2 1 3 = 2 hunds. 1 ten 3 units.
4 3 1 = 4 hunds. 3 tens 1 unit.
Sum, 9 6 8 = 9 hunds. 6 tens 8 units.

Each of these numbers is made up of hundreds, tens, and units.

Adding each, the sum is 9 hundreds 6 tens 8 units, or 968 units.

In a similar manner add the following:

(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)
213	304	503	104	504
425	123	172	302	670
160	562	223	493	125

LESSON LXXVII.

The following are all the combinations that can be made with the nine digits, except with the unit 1, up to 9 and 9 are 18.

These thoroughly committed to memory, will very much facilitate the adding of long columns with ease and accuracy.

2 and 2 are 4
2 and 3 are 5
2 and 4 are 6
2 and 5 are 7
2 and 6 are 8
2 and 7 are 9
2 and 8 are 10
2 and 9 are 11
3 and 3 are 6
3 and 4 are 7
3 and 5 are 8
3 and 6 are 9
3 and 7 are 10
3 and 8 are 11
3 and 9 are 12
4 and 4 are 8
4 and 5 are 9
4 and 6 are 10
4 and 7 are 11
4 and 8 are 12
4 and 9 are 13
5 and 5 are 10
5 and 6 are 11
5 and 7 are 12
5 and 8 are 13
5 and 9 are 14
6 and 6 are 12
6 and 7 are 13
6 and 8 are 14
6 and 9 are 15
7 and 7 are 14
7 and 8 are 15
7 and 9 are 16
8 and 8 are 16
8 and 9 are 17
9 and 9 are 18

Let the above combinations be repeated also in the reversed order; thus, 2 and 5 are 7, 5 and 2 are 7, etc.

The above may also be used for subtraction, the third column being the minuend, and either of the others the subtrahend.

Copy the above on slate, or board, in each form, using the signs.

LESSON LXXVIII.

How many are

1. $2+2$, $2+12$, $2+22$, $2+32$, etc., to $2+92$?

2. $3+2$, $3+12$, $3+22$, $3+32$, etc., to $3+92$?

3. $4+2$, etc., to $4+92$?

4. $5+2$, etc., to $5+92$?

5. $6+2$, etc., to $6+92$?

6. $7+2$, etc., to $7+92$?

7. $8+2$, etc., to $8+92$?

8. $9+2$, etc., to $9+92$?

How many are

9. $2+3$, $2+13$, etc., to $2+93$?

10. $3+3$, $3+13$, etc., to $3+93$?

11. The same also, with 4, 5, 6, 7, 8, and 9.

12. Then $2+4$, etc., $3+4$, etc., $4+4$, etc., as above.

13. In the same way, $2+5$, etc., $3+5$, etc., to $9+5$, etc., till the sum is $9+85$.

The foregoing is given only as a sample of a series of exercises, which will help to secure rapidity and accuracy in all possible combinations of the 9 digits with any number.

1. Name all the numbers in combinations of two each, that make 4. *Ans.* $3+1=4$, $2+2=4$, $1+3=4$.

2. Name all that make 5.

Ans. $4+1$, $3+2$, $2+3$, and $1+4$.

3. That make 6. *Ans.* $5+1$, $4+2$, $3+3$, $2+4$, and $1+5$.

In the same manner, the numbers that make,

7 9 11 13 15 17 19 21 23
8 10 12 14 16 18 20 22 24

4. Write on the slate or board a table of each; thus of 7,
$6+1=7$, $5+2=7$, $4+3=7$, $3+4=7$, $2+5=7$, $1+6=7$.
$7-1=6$, $7-2=5$, $7-3=4$, $7-4=3$, $7-5=2$, $7-6=1$.

LESSON LXXIX.

1. How many tens in 34 units? *Ans.* 3 tens and 4 units.

2. How many tens in 37 units? In 56 units?

3. How many hundreds in 30 tens? In 50 tens?

4. How many hundreds in 36 tens?

EXERCISES FOR THE SLATE AND BOARD.

1. What is the sum of 524, 315, and 472?

524
345
473
Sum 1342

Write units of the same order in the same column.

Begin at the bottom of the units column, and add each column separately, and instead of saying 3 units and 5 units are 8 units, and 4 units are 12 units, name the successive *results* only; thus, 3, 8, 12, the sum of the *units*, equal to 1 ten and 2 units. Write the 2 units in units' place, and add the 1 ten to the lower number in the tens' column; then, 1, 8, 12, 14, the sum of the *tens*, equal to 1 hundred and 4 tens. Write the 4 tens in tens' place and add the 1 hundred to the hundreds' column; then, 1, 5, 8, 13, the sum of the *hundreds*, equal to 1 thousand and 3 hundreds, which write in the hundreds' and thousands' places.

In the same manner copy, and add:

(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)	(*7.*)
423	304	210	514	75	716
542	718	634	301	610	84
365	532	184	198	393	205

(*8.*)		(*9.*)		(*10.*)		(*11.*)	
134	men.	384	boys.	300	pounds.	2036	days.
250	"	92	"	480	"	462	"
675	"	807	"	78	"	84	"

LESSON LXXX.

Count

1. By 2's from 0 to 36.
2. By 3's from 0 to 27.
3. By 3's from 2 to 29.
4. By 3's from 1 to 31.
5. By 4's from 0 to 40.
6. By 4's from 1 to 37.
7. By 4's from 2 to 38.
8. By 4's from 3 to 39.
9. By 5's from 0 to 40.
10. By 5's from 1 to 36.
11. By 5's from 2 to 37.
12. By 5's from 3 to 38.
13. By 6's from 0 to 36.
14. By 6's from 2 to 38.
15. By 6's from 4 to 40.
16. By 6's from 5 to 41.

Count back

17. By 2's from 30 to 0.
18. By 2's from 29 to 1.
19. By 3's from 30 to 0.
20. By 3's from 28 to 1.
21. By 3's from 29 to 2.
22. By 4's from 40 to 0.
23. By 4's from 41 to 1.
24. By 4's from 42 to 2.
25. By 4's from 43 to 3.
26. By 5's from 40 to 0.
27. By 5's from 41 to 1.
28. By 5's from 42 to 2.
29. By 5's from 43 to 3.
30. By 6's from 37 to 1.
31. By 6's from 39 to 3.
32. By 6's from 38 to 2.
33. By 6's from 40 to 4.
34. By 6's from 41 to 5.

EXERCISES FOR THE SLATE AND BOARD.

Copy and add

(*1.*)	(*2.*)	(*3.*)
3 3 3 3	3 3 3 3	3 3 3 3
3 3 3 3	3 3 3 3	3 3 3 3
3 3 3 3	3 3 3 3	3 3 3 3
3 3 3 3	3 3 3 3	3 3 3 3
2 1 0 0	4 3 2 1	5 4 3 2

LESSON LXXXI.

1. Count alternately by 2's and 3's to 35.

* **Written,—2 + 3 + 2 + 3 + 2 + 3 + 2 + 3 + 2 + 3 + 2 + 3 + 2 + 3.**
Counted,—5, 7, 10, 12, 15, 17, 20, 22, 25, 27, 30, 32, 35.

Count

2. By 2's and 3's to 40.
3. By 3's and 4's to 28.
4. By 2's and 4's to 36.
5. By 2's and 5's to 28
6. By 3's and 5's to 32
7. By 4's and 5's to 36.

Exercises for the Slate and Board.

Copy and add

(*1.*)
4 4 4 4
4 4 4 4
4 4 4 4
4 4 4 4
2 1 0 0

(*2.*)
4 4 4 4
4 4 4 4
4 4 4 4
4 4 4 4
4 4 3 3

(*3.*)
4 4 4 4
4 4 4 4
4 4 4 4
4 4 4 4
9 8 7 6

(*4.*)
5 5 5 5
5 5 5 5
5 5 5 5
3 2 1 0

(*5.*)
5 5 5 5
5 5 5 5
5 5 5 5
5 4 3 2

(*6.*)
5 5 5 5
5 5 5 5
5 5 5 5
8 7 6 4

(*7.*)
6 6 6 6
6 6 6 6
6 6 6 6
1 2 3 6

(*8.*)
6 6 6 6
6 6 6 6
6 6 6 6
3 2 1 4

(*9.*)
6 6 6 6
6 6 6 6
6 6 6 6
7 6 8 6

---

* **This exercise may at first be written on the board and counted *at sight.***

LESSON LXXXII.

1. Count by 7's, from 0 to 49; from 1 to 43; from 2 to 44; from 4 to 46; from 5 to 47; from 6 to 48.

2. Count by 8's, from 0 to 48; from 1 to 49; from 2 to 50; from 4 to 52; from 5 to 53; from 6 to 54; from 7 to 55.

3. Count by 9's, from 0 to 54; from 1 to 46; from 2 to 47; from 4 to 49; from 5 to 50; from 6 to 51; from 7 to 52;

4. Count back by 7's from 49 to 0; 46 to 4; 43 to 1.

5. By 8's from 48 to 0; from 42 to 2; from 47 to 7.

6. By 9's from 45 to 0; from 40 to 4; from 41 to 5.

EXERCISES FOR THE SLATE AND BOARD.

Copy and add,

(*1.*)
7 7 7 7
7 7 7 7
7 7 7 7
2 1 0 0

(*2.*)
7 7 7 7
7 7 7 7
7 7 7 7
3 2 1 0

(*3.*)
7 7 7 7
7 7 7 7
7 7 7 7
7 6 5 4

(*4.*)
8 8 8 8
8 8 8 8
8 8 8 8
3 2 1 0

(*5.*)
8 8 8 8
8 8 8 8
8 8 8 8
6 5 4 3

(*6.*)
8 8 8 8
8 8 8 8
8 8 8 8
9 8 7 6

(*7.*)
9 9 9 9
9 9 9 9
9 9 9 9
4 3 2 1

(*8.*)
9 9 9 9
9 9 9 9
9 9 9 9
8 7 6 5

(*9.*)
9 9 9 9
9 9 9 9
9 9 9 9
9 8 7 6

LESSON LXXXIII.

Addition at Sight.

1. Any two numbers less than 100, one of which contains only tens, may be added at sight (or orally). Thus, 34+20=54.

Observe, that 3 tens and 2 tens are 5 tens or 50, and the 4 units make 54.

2. Name the results to the following:

20+ 8
30+12
30+16
30+20
34+40
40+14
40+26
40+42
50+27
56+30
50+18
60+33
60+25
70+14
17+60
80+17
70+27
20+36
50+44
28+50

ADDING UNITS AND TENS ORALLY.

1. What is the sum of 23 and 45?

ANALYSIS.—23 is equal to 2 tens and 3 units; 45 is equal to 4 tens and 5 units; 2 tens and 4 tens are 6 tens or 60, and 3 units and 5 units are 8 units; 60 and 8 are 68. Hence 23 and 45 are 68.

In like manner find the sum of

2. 12+49.
3. 23+64.
4. 38+17.
5. 51+26.
6. 29+30.
7. 48+34.
8. 72+16.
9. 37+26.

EXERCISES FOR THE SLATE AND BOARD.

1. What is the sum of 56 feet, 450 feet, and 680 feet?

2. A farmer sold 48 bushels of wheat, 36 bushels of corn, 27 bushels of rye, and 28 bushels of barley; how many bushels of grain did he sell in all?

3. *What is the* sum of 1942 dollars, and 685 dollars?

LESSON LXXXIV.

Direct the attention of the pupil to the fact, that *the same figures when added, always give the same unit figure in the result.* That is, 3 and 5 are 8; 3 and 25 are 28; 3 and 45 are 48, etc. If, in adding any of the higher numbers, he hesitates, refer him to the *primary sum* of those numbers. Thus, if the pupil hesitates on 68 and 5, ask: "What unit figure do 8 and 5 give?" (*Ans.* 3.) Then 68 and 5 must give the next 3 above 68, that is 73.

The pupil should be required to perform all operations on the slate or board, without moving the lips, pronouncing or writing the *results* only.

BLACKBOARD DRILL.

Place an example upon the blackboard, as the following:

```
 267189
 485736
 918753
 592847
 703928
 564789
-------
3533242
```

Call upon some pupil, who will begin with the right hand column and say, "9, 17, 24, 27, 33, 42 *units*, equal to 4 tens and 2 units; write the 2 units under the column added, and add the 4 tens to the next column." The next pupil will without any delay take up the process, beginning with the 4 tens reserved, and say, "4, 12, 14, 18, 23, 26, 34 *tens*, equal to 3 hundreds and 4 tens; write the 4 tens under the column added and add the 3 hundreds to the next column." So in quick succession let each column be added upwards, then downwards, then from right to left, and from left to right, until the whole class have been exercised upon this example.

Very young children, if properly drilled on preceding lessons, may easily be taught, in this way, to add long columns of figures with astonishing rapidity and correctness.

To vary the above, let each pupil in order give *one* result only, the next pupil, immediately pronouncing the following, etc.

LESSON LXXXV.

EXERCISES FOR THE SLATE AND BOARD.

(*1.*)	(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)
men.	feet.	days.	feet.	miles.	pounds
542	820	153	1450	2157	1740
176	507	208	1234	1528	2031
628	418	759	2357	1372	1507
473	256	380	1567	2143	1423

(*7.*)	(*8.*)	(*9.*)	(*10.*)	(*11.*)	(*12.*)
1247	5020	1305	3172	1526	4214
2072	1513	6040	1094	5017	2030
4289	3156	3708	7165	2157	5327
3070	1208	1159	2082	1215	1456

Exercise the class on the following, as suggested in Lesson LXXXIV.

(*13.*)	(*14.*)	(*15.*)	(*16.*)	(*17.*)
3678	8786	78982	37987	216677
2766	5968	69771	66789	569911
8345	8789	68339	44321	543344
3875	9896	56234	91389	576677

(*18.*	(*19.*)	(*20.*)	(*21.*)	(*22.*)
32507	23412	35092	275143	1214187
10325	57638	52803	413100	2742361
47018	15421	47524	650406	1275142
53106	62732	60832	210350	2020560
61007	54298	11462	132415	1603915
27589	17323	74260	113765	1846084

SUBTRACTION

LESSON LXXXVI.

1. If 8 cents be taken from 14 cents, how many cents remain? *Ans.* 6 cents.

Since 14 is *diminished,* or *made less,* by subtracting 8 from it, 14, the greater number, is named the ***Minuend,*** which means *to be diminished,* and 8, the less number, is named the ***Subtrahend,*** which means *to be subtracted.*

Since 6 shows how many cents *remain* after subtracting 8 cents from 14 cents, it is named the ***Remainder,*** or the ***Difference*** between 14 and 8.

2. What is the difference between 13 horses and 9 horses?

3. Sixteen men are how many more than 8 men?

4. Five cents are how many less than 12 cents?

5. How many must be added to 9 to make 12?

6. Can you take 6 boys from 11 sheep? Why not?

Ans. Only numbers representing things of the *same kind* can be subtracted.

7. Harry bought 12 peaches, and gave 5 of them to his sister; how many had he left? 12—5= ?

ANALYSIS.—He had left the *difference* between 12 and 5, which is 7. 12—5=7.

8. On a tree were 16 pigeons, and 9 flew away; how many were left on the tree? 16—9= ?

9. How many are

19— 6?
20—10?
17—11?

24 less 6?
15 less 9?
21 less 7?

4 from 11?
7 from 19?
8 from 24?

LESSON LXXXVII.

1. How many are 10 less 2? 11 less 2? 12 less 2? 13 less 2? etc., to 20 less 2?

2. How many are 10 less 3? 11 less 3? 12 less 3? 13 less 3? etc., to 30 less 3?

3. How many are 10—4? 11—4? 12—4? 13—4? etc.

4. Subtract 7 from 10: from 11; from 12; from 13; etc.

5. Take 8 from 10; from 11; from 15; from 16; etc.

6. How many are 10—9? 11—9? 12—9? 14—9? 15—9? 16—9? etc., to 35—9?

7. George had 17 marbles, and gave five to one boy and 4 to another; how many marbles had he left? 17—9= ?

Analysis.—He had left the *difference* between the *sum* of 5 marbles and 4 marbles or 9 marbles, and 17 marbles which is 8 marbles.

8. Jane had 18 cents, and she bought a yard of ribbon for 6 cents, and a spool of thread for 5 cents; how many cents had she left? 18—11= ?

9. James bought a ball for 10 cents and a pencil for 6 cents. How much change should he receive for 25 cents?

10. Copy and write the *result* in place of (?):

14—7= ?
18—5= ?
12—3= ?
21—8= ?
19—7= ?
15—4= ?
24—10= ?
21— 9= ?
17— 8= ?

11. Also the following:

6+10—4= ?
7— 4+8= ?
9+ 5—6= ?
12+5— 8= ?
20—9+12= ?
16—7+13= ?
14—10+12= ?
25+ 7— 2= ?
18— 9+20= ?

LESSON LXXXVIII.

When numbers are so large that the difference cannot be found at once, units may be taken from units, tens from tens, and hundreds from hundreds, etc.

Exercises for the Slate and Board.

1. Subtract 644 from 968.

Minuend,	968	=	9 hunds.	6 tens	8 units.
Subtrahend,	644		6 "	4 "	4 "
Difference,	324		3 "	2 "	4 "

Proof.—Add the difference to the subtrahend. If the work is right, the sum will equal the minuend. Thus, 968−644=324, the *difference;* and 324+644=968, the *minuend.*

In like manner subtract and prove the following:

	(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)
Minuend,	835	769	578	274	857
Subtrahend,	423	634	453	121	524
Difference,	412				

(*7.*)	(*8.*)	(*9.*)	(*10.*)	(*11.*)
936	792	478	891	527
214	351	436	170	204

Subtract and prove:

12. 623 from 944.
13. 431 from 862.
14. 354 from 798.
15. 256 from 579.
16. 170 from 382.
17. 322 from 694.
18. 4206 from 9876.

19. 899 — 673.
20. 777 — 504.
21. 999 — 657.
22. 886 — 273.
23. 709 — 207.
24. 686 — 475.
25. 8989 — 4736.

LESSON LXXXIX.

1. One ten is how many more than 1 unit?

2. One ten is how many more than 3 units?

3. Two tens are how many more than 7 units?

4. Twenty-five are how many more than 6? than 7?

5. Two tens and 6 units less 8 units are how many?

Analysis.—2 tens and 6 units are 26 units, or 1 ten 16 units; and 8 units from 1 ten 16 units leaves 1 ten 8 units, or 18 units.

6. Three tens 5 units less 1 ten 6 units are how many? 35—16= ?

Analysis.—3 tens 5 units equal 2 tens 15 units; and 1 ten 6 units from 2 tens 15 units leaves 1 ten 9 units, or 19 units.

Exercises for the Slate and Board.

1. Subtract 27 from 84.

Minuend, $\overset{7}{\cancel{8}}\ \overset{14}{\cancel{4}}$
Subtrahend, $\underline{2\ 7}$
Remainder, 5 7

84 is 8 tens and 4 units, 27 is 2 tens and 7 units. Since 7 units cannot be subtracted from 4 units, increase the 4 units by 1 ten or 10 units from the next higher order, making 14 units. 7 units from 14 units leave 7 units, which write in units' place. Since we have taken 1 of the 8 tens, there are only 7 tens left. 2 tens from 7 tens leave 5 tens, which write in tens' place. Hence, 27 from 84 leaves 57. **Proof**: 57+27=84.

Copy, subtract and prove the following:

	(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)
Minuend,	439	674	523	834	423
Subtrahend,	172	327	247	263	276

(*7.*)	(*8.*)	(*9.*)	(*10.*)	(*11.*)	(*12.*)
4571	5274	7345	9876	6721	2925
2786	1548	5456	4894	3834	1673

LESSON XC.

1. A boy had 9 cents, he earned 10 more, then gave 7 to his sister. How many cents had he left?

2. Five pounds, 7 pounds, and 4 pounds are how many less than 20 pounds?

3. Belle had 16 pinks, and gave 3 to Mary, and 5 to Anna. How many had she left?

4. Jennie had 25 cents, and bought some buttons for 8 cents, a pencil for 4 cents, and some thread for 6 cents. How many cents had she left?

5. Ned having 19 cents, lost 4, spent 5, earned 3, and gave away 6. How many cents had he then?

6. How many are 5, 7, and 4, less 2 and 3?

7. How many are 10, 3, and 6, less 5 and 7?

8. How many are 15 less 7 added to 4 and 3?

9. How many are 12 less 5, added to 10 less 3?

10. How many are 13 and 7, less 6 and 9?

11. How many are 10, 7, and 5, less 9 and 3?

EXERCISE FOR THE SLATE AND BOARD, OR ORALLY.

Copy and write the proper *number* in place of (?):

12. $18 - 7 + 7 = ?$
13. $20 + 18 - ? = 25.$
14. $9 + 11 = 10 + ?$
15. $24 - ? = 7 + 9.$
16. $21 - 9 + ? = 19.$
17. $24 + ? = 12 + 18.$
18. $? + 16 = 26 - 6.$
19. $10 + 13 = ? + 11.$
20. $27 - 7 = 17 + ?$
21. $36 + 4 = ? + 20.$
22. $11 + 7 = 26 - ?$
23. $23 - 5 = ? + 2.$

The teacher should increase the number of examples in every lesson, as the capacity of the class may require, or the time allow.

LESSON XCI.

How many are

1. 2 from 2, 2 from 12, etc., to 2 from 92?

2. 2 from 3, 2 from 13, etc., to 2 from 93?

3. 2 from 4, 2 from 14, etc., to 2 from 94?

4. 2 from 5, 2 from 15, etc., to 2 from 95?

5. 2 from 6, 2 from 16, etc., to 2 from 96?

6. 2 from 7, 2 from 17, etc., to 2 from 97?

7. 2 from 8, 2 from 18, etc., to 2 from 98?

8. 2 from 9, 2 from 19, etc., to 2 from 99?

9. 2 from 10, 2 from 20, etc., to 2 from 90?

10. In the same manner 3 from 10, 3 from 11, 3 from 12, and 3 from 19, etc., to 3 from 99.

11. Also, 4 from 10, etc., 5 from 10, etc., until all the 9 digits have been used in the same way.

12. One ten is equal to how many units?

13. One hundred is equal to how many tens?

14. Two hundred is how many tens more than 2 tens?

15. Three hundred is how many tens more than 4 tens? than 5 tens?

16. Three hundred is equal to 2 hundred and how many tens? *Ans.* 300=200 and 10 tens.

17. If 2 tens or 20 units be taken from 3 hundred, what remains? *Ans.* 300=200 and 10 tens: 2 tens from 200 and 10 tens leave 200 and 8 tens, or 280.

18. Four hundred and 3 tens, less 1 hundred and 4 tens are how many?

ANALYSIS.—4 hundred and 3 tens,(equal 3 hundred and 13 tens) *less 1 hundred and 4* tens, equal 2 hundred and 9 tens, or 290.

LESSON XCII.

EXERCISES FOR THE SLATE AND BOARD.

1. Subtract 279 from 800.

$$\begin{array}{ll} \text{Minuend,} & \overset{7}{\cancel{8}}\;\overset{9}{\cancel{0}}\;\overset{10}{\cancel{0}} \\ \text{Subtrahend,} & \underline{2\;7\;9} \\ \text{Remainder,} & 5\;2\;1 \end{array}$$

Since 9 cannot be taken from 0 units, and since there are *no tens*, we cannot take 1 from that order. Going on to the order of *hundreds*, take 1 hundred, equal to 10 *tens* leaving 7 hundreds; of these 10 tens take 1 ten or 10 *units*, leaving 9 tens, and the minuend 800 is equal to 7 hundred 9 tens and 10 units (700 + 90 + 10 = 800). Subtract as before

In like manner copy, subtract, and prove:

2. 267 from 500.
3. 672 from 740.
4. 504 from 820.
5. 1260 from 3005.
6. 4521 from 6206.
7. 2241 from 7000.
8. 127 from 4300.
9. 32 from 1000.
10. 3030 from 10200.
11. 237 from 8040.

Find the *difference* between

12. 524 and 376.
13. 427 and 806.
14. 900 and 679.
15. 321 and 450.
16. 784 and 508.
17. 907 and 2340.
18. 89 and 1472.
19. 1200 and 164.
20. 2040 and 320.
21. 3672 and 1075.

What is the result

22. Of 3416 — 2040.
23. Of 4006 — 844.
24. Of 6400 — 640.
25. Of 2706 — 1371.
26. Of 7120 — 762.
27. Of 12364 — 1400.
28. Of 8070 — 4105.
29. Of 7346 — 6462.
30. Of 20371 — 8106.
31. Of 16070 — 1284.

LESSON XCIII.

Subtraction at Sight.

Any number may be subtracted from another at sight, if the difference is not greater than 10. Thus,

1. $9-5=4$; $19-15=4$; $29-25=4$; $39-35=4$, etc.

2. $14-6=8$; $24-16=8$; $34-26=8$; $44-36=8$, etc.

3. How many are

49 — 43? 36 — 29? 63 — 58? 92 — 84?
52 — 47? 78 — 70? 83 — 76? 81 — 73?

Any number not greater than 10 can be subtracted at sight from any other number. Thus,

4. $8-3=5$; $18-3=15$; $28-3=25$; $38-3=35$, etc.

5. $15-7=8$; $25-7=18$; $35-7=28$; $45-7=38$, etc.

6. How many are

27—8? 49—3? 51—4? 81—5? 61—2?
36—7? 64—9? 73—6? 94—8? 75—9?

ORAL AND WRITTEN EXERCISE.

(*1.*)
3 4 4
5 7 9
9 2 3
1 8 4 6
3 6 9 2
7 3 8 4

Write the two numbers 344 and 579, and add them without drawing a line, and write their sum 923 as the *third* number; then add the three numbers and write their sum, 1846, as the *fourth* number; then add the four numbers, and write their sum, 3692, as the *fifth*, and so on.

The same example may be used for exercise in subtraction, by subtracting from the last result each of the preceding numbers in succession, until *nothing* remains.

In the same manner, copy, add, and prove the following, extending each to the *sixth* number:

(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)
327	674	384	540	1257
918	241	609	703	720

MULTIPLICATION

LESSON XCIV.

1. If 5 boys can sit upon one bench, how many boys can sit upon 3 benches? 5 and 5 and 5 are how many?

2. If a man earn 3 dollars a day, how many dollars will he earn in 5 days? 3 + 3 + 3 + 3 + 3, are how many? Five 3's, or 5 times 3, are how many?

3. Count to 15 by 3's. By 5's. How many 3's in 15? How many 5's?

4. There are 7 days in 1 week; how many days are there in 4 weeks? 7 + 7 + 7 + 7 = ? Four 7's, or 7 × 4 = ?

5. Count by 4's to 28. By 7's. How many 4's in 28? How many 7's?

6. Is the result of 4 times 7 and of 7 times 4 the same?

7. At 4 dollars a barrel, what will 6 barrels of apples cost? Six 4's, or 6 times 4, are how many?

8. What is the difference between six 3's and three 6's?

9. How many are eight 3's? 3 times 8? 8 × 3?

10. Repeat the table from 0 times 2 to 12 times 2. Thus,

0 times 2 is 0, once 2 is 2, twice 2 are 4, 3 times 2 are 6, etc.

11. Repeat back from 12 times 2 to 0 times 2. Thus,

12 times 2 are 24, 11 times 2 are 22, 10 times 2 are 20, etc

12. From 0 times 3 to 12 times 3, and back to 0 times 3.

13. From 0 times 3 to 12 times 4, and back.

14. From 0 times 5 to 12 times 5, and back.

LESSON XCV.

1. If one hat cost 7 dollars, what will 4 hats cost?

Solution.—Since 1 hat costs 7 dollars, 4 hats will cost 4 times 7 dollars, or 28 dollars.

2. At 6 cents each, what will 5 pencils cost?

3. At 8 cents a pound, what will 6 pounds of soap cost?

4. If a man earn 4 dollars a day, how many dollars can he earn in 8 days?

5. If 5 boys have 7 marbles each, how many marbles have they all?

6. What is the cost of 6 books, at 4 dollars each?

7. If a boy receives 5 merit marks a day for 5 days, how many marks does he receive in all?

8. If a horse trot 8 miles an hour, how far will he trot in 6 hours?

9. Bessie had 3 rose-bushes, and there were 9 roses on each bush. How many roses upon all?

Repeat the table

10. From 0 times 6 to 12 times 6, and back to 0 times 6.

11. From 0 times 7 to 12 times 7, and back.

12. From 0 times 8 to 12 times 8, and back.

13. How many units are 4 times 9 units? How many tens? *Ans.* 3 tens and 6 units.

14. How many are 5 times 12 units? How many tens?

15. How many tens are 6 times 5 tens? How many hundreds? How many units?

16. How many are 4 times 6 tens? How many hundreds and tens? How many units?

17. How many hundreds are 3 times 7 tens?

LESSON XCVI.

1. Taking one of two numbers as many times as there are units in the other is called ***Multiplication.***

2. The number taken or multiplied is named the ***Multiplicand.***

3. The number to multiply by, or that shows *how many times* the multiplicand is to be taken, is named the ***Multiplier.***

4. The result obtained by the multiplication is named the ***Product.***

5. The multiplicand and multiplier are ***Factors*** of the product.

6. Thus, 8 × 6 = 48. 8 is the *multiplicand,* 6 is the *multiplier,* 48 is the *product,* and 8 and 6 are the *factors.*

EXERCISES FOR THE SLATE AND BOARD.

1. How many are 3 times 42?

BY ADDITION.

$$\text{Numbers to be added,}\left\{\begin{array}{r} 42 \\ 42 \\ \underline{42} \end{array}\right.$$
$$\textit{Sum,}\quad 126$$

BY MULTIPLICATION.

$$\begin{array}{lr} \text{Multiplicand,} & 42 \\ \text{Multiplier,} & \underline{\quad 3} \\ \textit{Product,} & 126 \end{array}$$

The result may be obtained by *addition.* Write 42 *three* times and add; the *sum* is 126. But it may be done more quickly and easily by writing the multiplicand 42 but once; and as it is to be taken 3 times, write the multiplier 3 under it in units' place and multiply. Thus, 3 times 2 units are 6 units, which write in units' place; and 3 times 4 tens are 12 tens, or 1 hundred and 2 tens, which write in tens' and hundreds' place. Hence the *product* 126 is the same as the *sum*

In like manner solve by both methods:

2. 3 times 53.
3. 5 times 61.
4. 4 times 220.
5. 2 times 643.
6. 3 times 4032.
7. 6 times 610.
8. 4 times 3102.
9. 2 times 7234.

LESSON XCVII.

1. At 5 dollars a cord, what will 6 cords of wood cost? 7 cords? 8 cords?

2. If there are 8 trees in one row, how many trees in 5 rows? In 8 rows? In 9 rows? In 10 rows?

3. If you earn 12 cents an hour, how many cents can you earn in 3 hours? In 5 hours? In 6 hours? In 7 hours? In 10 hours?

4. How many are 5 times 10 cents, and 8 cents more?

5. How many are 6 times 7 dollars, less 5 dollars?

6. James gave 4 cents apiece for 5 oranges, and had 10 cents left. How much money had he at first?

7. Belle paid 6 cents a yard for 3 yards of ribbon. How much change should she receive for 25 cents?

EXERCISES FOR SLATE AND BOARD.

1. How many are 4 times 48?

Multiplicand, 48
Multiplier, 4
Product, 192

The result may be obtained by addition, but the shorter method is to write the multiplier under the multiplicand in units' place and multiply; thus,

4 times 8 units are 32 units, or 3 tens and 2 units. Write the 2 units in units' place, and reserve the 3 tens to add to the product of the tens. Next, 4 times 4 tens are 16 tens, and the 3 tens reserved added make 19 tens, or 1 hundred and 9 tens, which write in hundreds' and tens' places. Hence, 4 times 48 are 192.

	(2.)	*(3.)*	*(4.)*	*(5.)*
Multiply	72	136	247	1265
By	4	5	3	6

6. Multiply 2436 by 3; by 5; by 4; by 6.

7. Multiply 3057 by 2; by 3; by 4; by 5; by 6.

LESSON XCVIII.

The following table contains all the products from 12 to 144 inclusive that can be produced by any two factors, not less than 2 nor greater than 12.

These combinations should be thoroughly committed, and repeated in the *reverse*, as well as in the *direct* order.

2 × 6 = 12
3 × 4 = 12
2 × 7 = 14
3 × 5 = 15
2 × 8 = 16
4 × 4 = 16
2 × 9 = 18
3 × 6 = 18
2 × 10 = 20
4 × 5 = 20
3 × 7 = 21
2 × 11 = 22
2 × 12 = 24
3 × 8 = 24
4 × 6 = 24
5 × 5 = 25
3 × 9 = 27
4 × 7 = 28
3 × 10 = 30
5 × 6 = 30

4 × 8 = 32
3 × 11 = 33
5 × 7 = 35
3 × 12 = 36
4 × 9 = 36
6 × 6 = 36
4 × 10 = 40
5 × 8 = 40
6 × 7 = 42
4 × 11 = 44
5 × 9 = 45
4 × 12 = 48
6 × 8 = 48
7 × 7 = 49
5 × 10 = 50
6 × 9 = 54
5 × 11 = 55
7 × 8 = 56
6 × 10 = 60
5 × 12 = 60

7 × 9 = 63
8 × 8 = 64
6 × 11 = 66
7 × 10 = 70
8 × 9 = 72
6 × 12 = 72
7 × 11 = 77
8 × 10 = 80
9 × 9 = 81
7 × 12 = 84
8 × 11 = 88
9 × 10 = 90
8 × 12 = 96
9 × 11 = 99
10 × 10 = 100
10 × 11 = 110
10 × 12 = 120
11 × 11 = 121
11 × 12 = 132
12 × 12 = 144

The above may also be used as a *division table*, the numbers in the third column being used as dividends, and those either in the first or second as divisors. Thus, 2 times 6 are 12 ; 6 times 2 are 12. 6 in 12, 2 times ; 2 in 12, 6 times. ½ of 12 is 6 ; ⅙ of 12 is 2.

LESSON XCIX.

The following are all the products in the multiplication table to 132.

Let the pupil at sight, or upon hearing a number, name at least one set of factors. Thus, 21. *Ans.* 7 times 3, or 3 times 7. 60 *Ans.* 6 times 10, or 5 times 12, etc.

4
6
8
9
10
12
14
15
16
18
20
21
22
24
25
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28
30
32
33
35
36
40
42
44
45
48
49
50
54
55
56
60
63
64
66
70
72
77
80
81
88
90
96
99
100
108
110
121
132

EXERCISES FOR THE SLATE AND BOARD.

(1.)	*(2.)*	*(3.)*	*(4.)*
1026	4150	6703	14037
8	6	5	4

5. If there are 52 weeks in 1 year, how many weeks are there in 8 years?

6. If a steamer run 265 miles a day, how many miles will she run in 7 days?

7. A man bought 4 houses, and paid 4385 dollars for each. What did he pay for all?

8. *In 1 mile* are 5280 feet. How many feet in 3 miles?

LESSON C.

EXERCISES FOR SLATE AND BOARD, OR ORALLY.

Give the result of

3×7
7×5
4×9
9×6

5×3
8×8
7×6
4×7

6×3
9×9
8×7
6×9

9×7
4×6
5×8
7×5

6×7
8×3
3×9
3×10

The pupil may make oral problems for the above. Thus, for "8×7." "What will 7 lemons cost at 3 cents each?" Another pupil may solve the same by a simple analysis; thus, 7 lemons will cost 7 times 3 cents, or 21 cents.

Copy, and write the result in place of (?):

8×7+4=?
7×9+10=?
6×6+8=?
4×4+9=?

9×8−12=?
8×6−9=?
9×9−10=?
10×8−7=?

7×9+10=?
8×11−8=?
7×10+12=?
11×6−9=?

FOR THE SLATE AND BOARD.

In the following, the numbers given as multiplicands may each be multiplied, separately, by each of the multipliers following it; or first by one of them and the product by the next, and so on.

1. 9704×2, 4, 6, 8.
2. 658×3, 5, 7, 6.
3. 1463×4, 2, 3, 5.
4. 2789×3, 4, 2, 6.
5. 3596×2, 4, 3, 5.
6. 2043×4, 5, 2, 7.
7. 3804×5, 6, 7.
8. 2964×3, 8, 6.
9. 4070×5, 9, 4.
10. 5164×7, 8, 9.
11. 3005×8, 9, 5.
12. 10804×6, 7, 8, 9.

LESSON CI.

Multiplication at Sight.

8×12=?	6×?=72	?×7=84	9×?=81
9×6=?	?×5=45	12×?=60	?×11=77

12	?	12	?	7	12	?	?	11
8	8	?	9	?	?	9	12	?
?	96	96	72	63	84	81	60	99

This exercise may be continued at the option of the teacher.

Exercises for the Slate and Board.

1. Multiply 362 by 24.

Multiplicand,	362	
Multiplier,	24	
	1448	4 times.
	724	20 times.
Product,	8688	24 times.

Write the multiplicand, and under it the multiplier, the units in units' place, and the tens in tens' place, and multiply by each figure separately.

Multiply 362 by the 4 units, and then by the 2 tens; add the products, and the sum is the entire product, 8688.

In multiplying by the units, write the first figure of the product in units' place. In multiplying by the tens, write the first figure of the product in tens' place.

In the same manner, multiply

2. 487 by 18.
3. 618 by 23.
4. 3241 by 16.
5. 2046 by 25.
6. 894 by 22.
7. 709 by 36.
8. Multiply 30426 by 17; by 28; by 35; by 44; by 42.
9. Multiply 24305 by 52; by 48; by 65; by 72; by 66.
10. Multiply 426173 by 61; by 43; by 53; by 19; by 34.

The teacher should increase these examples according to the wants and capacity of the class; also instruct them how to multiply *by 10, or 100.*

DIVISION

LESSON CII.

1. How many times 3 peaches are 18 peaches? How many 3's in 18? 18÷3= ?

2. How many times can 4 oranges be taken from 16 oranges? How many 4's in 16? 16÷4= ?

3. How many times 4 pounds are 20 pounds? How many 4's in 20?

4. How many times can 4 be taken from 20? 4 in 20 how many times? 20÷4= ?

5. If a box will hold 5 pounds of honey, how many such boxes will hold 30 pounds?

6. How many times 5 pounds are 30 pounds? How many 5's in 30? How many times can 5 be taken from 30?

7. From a pile of 24 marbles, how many groups of 4 marbles each can be made? 4 in 24, how many times?

8. How many groups of 6 each? How many 6's in 24?

9. How many groups of 3 each? How many 3's in 24?

10. How many groups of 8 each? How many 8's in 24?

11. How many groups of 2 each? How many 2's in 24?

12. How many times can 8 dollars be taken from 24 dollars? From 40 dollars? From 56 dollars?

13. How many times 8 in 24? In 40? In 56? In 64?

14. How many times 9 boys are 27 boys? Are 36 boys?

15. How many 9's in 18? In 27? In 54? In 72? In 81?

LESSON CIII.

1. At 4 cents each, how many lemons can be bought for 20 cents?

Solution.—As many lemons can be bought for 20 cents, as 4 cents are contained times in 20 cents, which are 5 times. Hence, at 4 cents each 5 lemons can be bought for 20 cents.

2. If a man earn 3 dollars a day, in how many days can he earn 12 dollars? 18 dollars? 27 dollars? 30 dollars?

3. If a horse travel 7 miles an hour, in how many hours can he travel 28 miles? 42 miles? 63 miles? 70 miles?

4. If 5 lemons cost 20 cents, what is the price of each?

Solution.—Since 5 lemons cost 20 cents, 1 lemon will cost 1 *fifth* of 20 cents, or 4 cents.

5. Do you find how many times 5 lemons are contained in 20 cents, or do you find *one* of 5 *equal parts* of 20 cents?

6. How do you find one of 5 equal parts of a number? One of 4 equal parts? One of 7 equal parts?

7. How many times 5 miles are 40 miles?

8. What is 1 of 5 *equal parts,* or 1 *fifth* of 40 miles?

9. If 18 boys sit on 3 benches, how many boys sit on each bench? 1 *third* of 18 boys are how many boys?

10. If 6 tons of coal cost 36 dollars, what is the cost of 1 ton?

11. If 8 cords of wood cost 40 dollars, what is the cost of 1 cord?

The teacher will observe and illustrate that both forms of division are deductions from multiplication. Thus, since 3 times 4 are 12, it follows that 4 is in 12 *three* times, and that 1 *third* of 12 is 4.

LESSON CIV.

1. Finding *how many times* one number is contained in another of the same kind, ~~or~~ finding ~~*one* of the~~ *equal parts* of a ~~number,~~ is called ***Division.***

2. The number divided is named the ***Dividend.***

3. The number used to divide by is named the ***Divisor.***

4. The result obtained by the division is named the ***Quotient.***

5. The divisor and quotient are the *factors* of the dividend.

6. When the division is not exact, the part of the dividend remaining is called the ***Remainder,*** and it must always be *less* than the *divisor.*

7. Thus, in the example, 72 ÷ 8 = 9, 72 is the *dividend,* 8 is the *divisor,* and 9 is the *quotient.* PROOF : 8 × 9 = 72.

EXERCISES FOR SLATE AND BOARD.

1. Divide 4680 by 2.

Divisor, Dividend.
2) 4680
Quotient, 2340

Write the divisor at the left of the dividend, with a curved line between them, and draw a line under the dividend. Begin with the highest order and divide, thus: 2 in 4, 2 times; 2 in 6, 3 times; 2 in 8, 4 times; 2 in 0, 0 times, writing each quotient figure under the figure divided, since it is the *same order* of units as that figure. PROOF: 2340 × 2 = 4680.

In the same manner, divide and prove

2. 396 by 3.
3. 8088 by 8.
4. 5050 by 5.
5. 4884 by 4.
6. 7007 by 7.
7. 8462 by 2.
8. 6248 by 3.
9. 9603 by 3.
10. 8008 by 8.
11. 7777 by 7.
12. 8408 by 4.
13. 5550 by 5.
14. 7007 by 7.
15. 8642 by 2.
16. 9000 by 9.

LESSON CV.

Exercises on the Tables.

1. Divide and prove; thus, 2 in 16, *eight* times; 8 times 2 are 16.

18 ÷ 6   28 ÷ 7   36 ÷ 9   40 ÷ 8
27 ÷ 9   36 ÷ 6   45 ÷ 5   56 ÷ 7
28 ÷ 4   42 ÷ 7   48 ÷ 6   54 ÷ 9

In proving division, multiply the divisor by the quotient, not the quotient by the divisor.

2. In the same manner, give the quotient and proof of the following:

64 ÷ 8 =   77 ÷ 11 =   81 ÷ 9 =   84 ÷ 7 =
72 ÷ 9 =   56 ÷ 8 =   72 ÷ 8 =   80 ÷ 8 =
63 ÷ 7 =   70 ÷ 10 =   60 ÷ 12 =   63 ÷ 9 =

3. In the following, find the product, and then each factor, thus:

Given 8 × 4. 4 times 8 are 32; 8 in 32, *four* times; 1 *fourth* of 32 is 8.

6 × 7   9 × 5   9 × 8   12 × 3
7 × 5   8 × 7   7 × 9   9 × 6
8 × 6   6 × 9   10 × 7   8 × 11
7 × 6   9 × 4   8 × 10   9 × 9

4. Copy and write the correct number in place of (?):

Quotients,	7	?	?	8	9	6	?
Divisors,	?	7	9	?	9	?	5
Dividends	70	70	63	64	?	54	60

LESSON CVI.

Exercises for the Slate and Board.

1. Divide 447 by 3.

$$\begin{array}{llll}
\text{Divisor.} & \text{Dividend.} & \text{Quotient.} \\
3\ ) & 447 & (\ 149 \\
 & \underline{3} & \\
 & 14 & \\
 & \underline{12} & \\
 & 27 & \\
 & \underline{27} & \\
 & 0 &
\end{array}$$

In this example, write the divisor at the left, and the quotient at the right of the dividend, and begin at the left to divide, thus: 3 is contained in 4, 1 time and a remainder; write 1 for the first figure of the quotient and multiply the divisor 3 by it, and subtract the product 3 from 4 hundreds, the number divided, and the remainder is 1 hundred, equal to 10 tens, to which add the 4 tens of the dividend, making 14 tens, expressed by bringing down the 4 to the right of the 1 hundred. Then 3 is contained in 14, 4 times and a remainder. Write the 4 in the quotient, multiply the divisor by it, and subtract the product 12 from 14, and the remainder is 2 tens, or 20 units, to which add the 7 units of the dividend, making 27. 3 is contained in 27, 9 times. Multiplying and subtracting as before, nothing remains. **Proof** : $149 \times 3 = 447$.

The work may be shortened very much by what is termed *Short Division*, as follows:

$$\begin{array}{l}
3\,\underline{)\,447} \\
\,149
\end{array}$$

3 is contained in 4, 1 time and 1 remainder; 1 prefixed or placed before 4, makes 14; 3 in 14, 4 times and 2 remainder; 2 prefixed to 7 makes 27; 3 in 27, 9 times. Hence the quotient is 149.

In like manner, divide and prove

2. 8752 by 4.
3. 7625 by 5.
4. 7122 by 6.
5. 5343 by 3.
6. 8561 by 7.
7. 9024 by 8.
8. 76344 by 6.
9. 90324 by 4.
10. 83210 by 5.

LESSON CVII.

1. If 6 men earn 24 dollars, what part of 24 dollars does 1 man earn? How many dollars?

2. At 9 cents a quart, how many quarts of milk can be bought for 63 cents?

3. How do the *solutions* of these two examples differ?

4. When the divisor and dividend are of the same name or kind, what do we do? *Ans.* Find *how many times* the dividend contains the divisor.

5. What is the quotient? *Ans. Times.*

6. When the divisor and dividend are not of the same name or kind, what do we do?

Ans. Find a *certain part* of the dividend.

7. What is the quotient? *Ans.* A *part* of the dividend

8. How many yards of cloth, at 7 dollars a yard, can be bought for 70 dollars? For 63 dollars? For 84 dollars?

EXERCISES FOR THE SLATE AND BOARD.

1. How many times is 6 contained in 1834?

Divisor. Dividend.

$$6\,\underline{)\,1834}$$

Quotient, $305\frac{4}{6}$

Since 6 is not contained in 1, say, 6 in 18, 3 times and no remainder; 6 in 3, 0 times and 3 remainder; 6 in 34, 5 times and 4 remainder, which write over the divisor 6, as a part of the quotient. PROOF: $305 \times 6 + 4 = 1834$.

In like manner,

2. Divide 3324 by 2; by 4; by 6; by 7; by 8.

3. Divide 9106 by 3; by 4; by 5; by 8.

4. Divide 60530 by 5; by 6; by 7; by 8; by 9.

5. Divide 65625 by 3; by 4; by 7; by 8; by 9.

LESSON CVIII.

ANOTHER FORM OF EXPRESSING DIVISION.

1. Division is sometimes indicated by placing the divisor under the dividend, and separating them by a line.

Thus, $\frac{12}{4}$ means 12 divided by 4, or 1 *fourth* of 12, and is the same as $12 \div 4$, the quotient being 3.

2. Find the quotient, or value, of each of the following:

$\frac{36}{9}$; $\frac{40}{5}$; $\frac{42}{7}$; $\frac{56}{8}$; $\frac{54}{9}$; $\frac{63}{7}$; $\frac{72}{6}$;
$\frac{42}{6}$; $\frac{50}{10}$; $\frac{45}{9}$; $\frac{60}{6}$; $\frac{56}{7}$; $\frac{64}{8}$; $\frac{81}{9}$.

This form of indicating division often simplifies two or more operations that are to be performed; thus,

3. It is required to multiply 12 by 5, and divide the product by 6.

Written, $\frac{12 \times 5}{6} = 10$; for, $12 \times 5 = 60$, and 1 *sixth* of 60, or $60 \div 6 = 10$.

4. To 7 times 8 add 4 and divide the sum by 6.

Written, $\frac{8 \times 7 + 4}{6} = 10$; for, 8×7 is 56, plus 4 is 60, and 1 *sixth* of 60, or $60 \div 6 = 10$.

Express by signs each of the following:

5. Divide the difference between 17 and 5 by 4.

6. Divide the product of 12 and 4 by 8.

7. What is 1 *seventh* of the sum of 34 and 8?

8. From the sum of 25 and 10 subtract 5, and divide the remainder by 6.

9. From the product of 10 and 7 subtract 6, and divide the remainder by 8.

LESSON CIX.

1. What is 1 half of 12? Of 16? Of 18 + 6?
2. What is 1 third of 15? Of 18? Of 21 + 9?
3. What is 1 fourth of 16? Of 24? Of 30 + 6?
4. What is 1 fifth of 20? Of 30? Of 40 — 5?
5. What is 1 sixth of 24? Of 36? Of 38 + 10?
6. What is 1 seventh of 35? Of 42? Of 60 — 11?
7. What is 1 eighth of 48? Of 32? Of 70 — 6?
8. What is 1 ninth of 54? Of 63? Of 60 + 12?
9. What is 1 tenth of 90? Of 87 — 7? Of 62 + 8?
10. What is $\frac{1}{3}$ of 4 times 9? $\frac{1}{4}$ of 5 times 8?
11. What is $\frac{1}{7}$ of 60 — 4? $\frac{1}{6}$ of 12×4? $\frac{1}{8}$ of 66 + 6?
12. What is $\frac{1}{4}$ of 6×6? $\frac{1}{9}$ of 12×6? $\frac{1}{6}$ of 75 — 9?

Exercises for the Slate and Board.

Find the value of each of the following expressions in a single number:

(*1.*) $\frac{21 - 9}{6}$
(*2.*) $\frac{43 - 7}{9}$
(*3.*) $\frac{12 \times 5}{10}$
(*4.*) $\frac{9 \times 8}{12}$
(*5.*) $\frac{7 \times 9 + 7}{7}$
(*6.*) $\frac{8 \times 9 - 8}{8}$
(*7.*) $\frac{6 \times 9 + 10}{8}$
(*8.*) $\frac{12 \times 7 + 6}{9}$
(*9.*) $\frac{13 + 34}{12}$
(*10.*) $\frac{42 + 36 - 14}{8}$
(*11.*) $\frac{45 \times 4 + 4}{2}$
(*12.*) $\frac{128 \times 3}{4}$
(*13.*) $\frac{28 \times 16}{8}$
(*14.*) $\frac{242 \times 21}{7}$

LESSON CX.

1. If 4 caps cost 12 dollars, what will 6 caps cost?

Solution.—Since 4 caps cost 12 dollars, 1 cap costs 1 fourth of 12 dollars, or 3 dollars; and 6 caps will cost 6 times 3 dollars, or 18 dollars.

2. How many dollars are 6 times 1 fourth of 12 dollars?

3. If 6 oranges cost 18 cents, what will 8 oranges cost?

4. If 7 yards of ribbon cost 56 cents, what will 3 yards cost? 5 yards? 8 yards? 6 yards? 9 yards?

5. If a man earns 30 dollars in 6 days, how many dollars does he earn in 4 days? In 3 days? In 5 days?

6. How many yards of cloth can I buy for 36 dollars, if 3 yards cost 12 dollars?

7. If a man walks 27 miles in 9 hours, how far does he walk in 7 hours?

8. How many are 8 times $\frac{1}{6}$ of 42? 9 times $\frac{1}{5}$ of 35? 10 times $\frac{1}{2}$ of 18? 6 times $\frac{1}{9}$ of 72?

Exercises for the Slate and Board.

1. If 6 acres of land are worth 366 dollars, what are 8 acres worth?

2. If there are 174 lines on 6 pages of this book, how many lines on 16 pages?

3. If 8 cords of wood are worth 32 dollars, what are 27 cords worth?

4. What will 45 pounds of beef cost, if 8 pounds cost 96 cents?

5. If 10 tons of coal are worth 70 dollars, what are 125 tons worth?

LESSON CXI.

Exercises for the Slate and Board.

1. Divide 3180 by 15.

15)3180(212
30
18
15
30
30

When the divisor consists of two or more figures, the operations of multiplying and subtracting cannot well be carried on in the mind, and so we write the result of each separate operation.

Since 15 is not contained in 3, we say 15 in 31, 2 times, and write the 2 at the right of the dividend as the first figure of the quotient. Multiply the divisor by this quotient figure, and write the product 30 under the figures divided.

Subtract, and to the remainder 1, annex 8, the next figure of the dividend, making 18 for a new dividend.

Dividing, multiplying and subtracting as before, we have a remainder of 3, to which annex the 0 of the dividend, and we have a new dividend of 30; which divide as before, and nothing remains. Proof: 212 × 15=3180.

2. Divide 12708 by 28.

Divisor. Dividend. Quotient.
28)12708($453\frac{24}{28}$
112
150
140
108
84
24 Remainder.

Proof.
453 Quotient.
28 Divisor.
3624
906
12684
24 Remainder.
12708 Dividend.

If the *product* of the divisor by the quotient figure is *greater* than the part of the dividend divided, the quotient figure is *too great* and must be *diminished.* If the *remainder* after any subtraction *is greater* than the divisor, the quotient figure is *too small, and must be increased.*

LESSON CXII.

1. How many times is 5 contained in 10 × 6?

2. How many times is 3 × 3 contained in 63?

3. Divide 48 by 1 sixth of 24. By 1 fourth of 32.

4. A boy gave 5 peaches to each of 6 boys, and had 1 third as many left. How many had he left?

5. Mary has 5 cents and Susie 7. If Willie has 4 times as many as both, how many cents has he?

6. What is 1 fourth of 6 times 8? 1 third of 5 times 6?

7. A man sold 8 barrels of apples at 5 dollars a barrel. How many yards of cloth, at 4 dollars a yard, can he buy with the money?

8. Three boys have some marbles. James has 10, Henry 9, and John 4. If they divide them equally, how many marbles will each have?

9. How many days work, at 4 dollars a day, will pay for 3 tons of coal worth 8 dollars a ton?

EXERCISES FOR THE SLATE AND BOARD.

1. Divide 32760 by 12; by 13; by 14; by 15.
2. Divide 970640 by 23; by 34; by 25; by 36.
3. Divide 40320 by 12; by 24; by 15; by 16.
4. Divide 816480 by 24; by 27; by 35; by 36.
5. Divide 445280 by 32; by 41; by 28; by 33.

6. How many pounds of sugar, at 14 cents a pound, will pay for 13 pounds of butter, at 28 cents a pound?

7. How many pounds of coffee worth 25 cents a pound, can be bought for 15 bushels of oats worth 65 cents a bushel?

LESSON CXIII.

1. A boy having 12 oranges bought 6 more, and then sold 7; how many had he left?

2. James sold his sled for 45 cents, which was 9 cents more than it cost: what did it cost?

3. Belle paid 8 cents a spool for 7 spools of thread, and 9 cents for some buttons: what did she pay for both?

4. Which is less, 7 times 8 or 6 times 9? Which is greater, 5 times 12 or 8 times 8?

5. What will be the cost of 7 coats at 12 dollars each?

6. If Jane has 11 cents and Grace has 6 times as many, how many cents has Grace? How many have both?

7. If John has 40 marbles and Dick has 1 fourth as many, how many marbles has Dick?

8. If 6 quarts of milk cost 54 cents, what will be the cost of 4 quarts? 7 quarts? 9 quarts? 8 quarts?

9. Willie sold his knife for 36 cents, and received in payment 3 quarts of chestnuts at 8 cents a quart, and the remainder in money; how much money did he receive?

10. If a man can chop 16 cords of wood in 8 days, how much can he chop in 3 days? In 5 days? In 7 days? In 12 days?

11. How many barrels of flour worth 8 dollars a barrel, will pay for 4 loads of hay worth 12 dollars a load?

12. If 7 yards of cloth cost 28 dollars, what will 5 yards cost?

13. If 1 yard of ribbon cost 10 cents, how many yards can be bought for 60 cents? For 70 cents? For 9 *cents? For 120* cents?

LESSON CXIV.

EXERCISES FOR THE SLATE AND BOARD.

1. The greater of two numbers is 590, and the less 364; what is their difference?

2. The less of two numbers is 128, and their difference is 75; what is the greater?

3. The sum of two numbers is 405, and one of the numbers is 214; what is the other?

4. How many must be added to 24 to make 56?

5. How many more than 124 men are 216 men?

6. How many less than 72 sheep are 27 sheep?

7. How many more than 65 + 36 is 124?

8. How many less than 184 + 153 is 246?

9. How many must be added to 74 + 127 to make 304?

10. A man paid 3146 dollars for a house, which was 380 dollars more than it was worth; what was it worth?

11. From 1705, take the sum of 540 and 603.

12. From the difference of 3242 and 646 take 845.

13. Bought a house for 5607 dollars, which was 825 less than it was worth; what was it worth?

14. A man owed 756 dollars, and paid at one time 206 dollars, and at another time 324 dollars. How much did he still owe?

15. Mr. Smith has 640 acres of land, and Mr. Jones has 124 acres less; how many acres has Mr. Jones?

16. From a bin containing 394 bushels of oats, 248 bushels were taken, and afterwards 86 bushels returned; how many bushels were then in the bin?

LESSON CXV.

Exercises for the Slate and Board.

1. If a steamer sail 265 miles a day, how far will she sail in 16 days? In 18 days? In 24 days?

2. A man bought 136 barrels of flour at 8 dollars a barrel, and sold the whole for 1248 dollars. What was his gain?

3. What is the value of each of the following articles: 25 pounds of sugar at 12 cents a pound; 16 pounds of tea at 75 cents a pound; and 38 pounds of ham at 14 cents a pound?

4. What is the value of the whole? How much more is the tea worth than the sugar?

5. How many tons of hay worth 16 dollars a ton, will pay for 24 cows worth 32 dollars each?

6. If a clerk has a salary of 950 dollars a year, and his expenses are 525 dollars a year, how much can he save in 6 years?

7. A farmer sold 96 bushels of potatoes, at 52 cents a bushel. How many pounds of coffee, at 26 cents a pound, will pay for the potatoes?

8. If 24 yards of cloth cost 144 dollars, what will 56 yards cost at the same rate?

9. A farmer sold 15 tons of hay, at 18 dollars a ton and 36 cords of wood, at 4 dollars a cord: what was the value of both?

10. He divided the whole amount of money equally *among 6 creditors*: how much did each receive?

LESSON CXVI.

1. Multiply 3417 by 9; by 12; by 14; by 16.
2. Multiply 10782 by 21; by 18; by 26; by 19.
3. Multiply 56043 by 32; by 25; by 36; by 27.
4. Multiply 28340 by 41; by 29; by 46; by 37.
5. Multiply 730081 by 44; by 53; by 38; by 54.
6. Multiply 186304 by 65; by 67; by 55; by 49.
7. Multiply 304071 by 46; by 72; by 84; by 66.
8. Multiply 415036 by 75; by 63; by 54; by 82.
9. Multiply 630400 by 46; by 57; by 68; by 74.
10. Multiply 297182 by 77; by 94; by 95; by 89.
11. Multiply 710345 by 68; by 77; by 81; by 93.

LESSON CXVII.

Find the value of

1. 598467 ÷ 6.
2. 541604 ÷ 8.
3. 639514 ÷ 4.
4. 954632 ÷ 7.
5. 985478 ÷ 7.
6. 517401 ÷ 8.
7. 378487 ÷ 9.
8. 371561 ÷ 8.
9. 6897583 ÷ 5.
10. 4996504 ÷ 8.
11. 1918575 ÷ 6.
12. 5982039 ÷ 9.

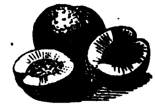
How many times

13. Is 13 contained in 273? In 4550? In 36721?
14. Is 17 contained in 2465? In 50571? In 1299123?
15. Is 18 contained in 10404? In 7831? In 11052?
16. Divide 35280 by 25; by 32; by 27; by 24.
17. Divide 122764 by 36; by 24; by 28; by 26.
18. Divide 7462450 by 42; by 36; by 52; by 48.

FRACTIONS

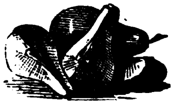
LESSON CXVIII.

1. If a peach is divided into *two equal parts,* one of these parts is called ***one-half*** of a peach.



2. How many halves make *one,* or a whole thing?

3. If a pear is divided into *three equal parts,* one of these parts is called ***one-third*** of a pear.



4. How many thirds make *one,* or a whole thing?

5. How many thirds in one pear?

6. If an apple is divided into *four equal parts,* one of these parts is called ***one-fourth*** of an apple.

7. How many fourths make *one,* or a whole thing?

8. If an orange is divided into *five equal parts,* one of these parts is called ***one-fifth*** of an orange.

9. How many fifths make *one,* or a whole thing?

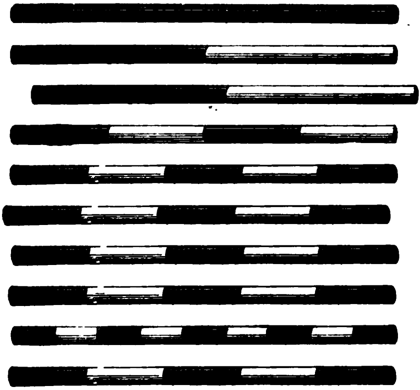
10. One-half is written $\frac{1}{2}$.

11. One-third is written $\frac{1}{3}$; two-thirds, $\frac{2}{3}$. One-fourth is written $\frac{1}{4}$; two-fourths, $\frac{2}{4}$; three-fourths, $\frac{3}{4}$.

12. One-fifth is written $\frac{1}{5}$; two-fifths, $\frac{2}{5}$; three-fifths, $\frac{3}{5}$; four-fifths, $\frac{4}{5}$; five-fifths, $\frac{5}{5}$.

LESSON CXIX.

1. One whole thing is equal to how many *halves?* *Thirds?* *Fourths?* *Fifths?* *Sixths?* *Sevenths?* etc.



One *unit.*	1
Two-halves.	$\frac{2}{2}$
Three-thirds.	$\frac{3}{3}$
Four-fourths.	$\frac{4}{4}$
Five-fifths.	$\frac{5}{5}$
Six-sixths.	$\frac{6}{6}$
Seven-sevenths.	$\frac{7}{7}$
Eight-eighths.	$\frac{8}{8}$
Nine-ninths.	$\frac{9}{9}$
Ten-tenths.	$\frac{10}{10}$

2. When anything is divided into *six* equal parts, what is one part called? *Two* parts? *Three* parts? *Four* parts? *Five* parts?

3. What is *one* of the *seven* equal parts of anything called? *Three* of seven equal parts? *Five* of seven equal parts? *Six* of seven equal parts?

4. What is meant by *one-eighth* of a number or whole thing? *Ans. One* of the *eight* equal parts of it.

5. What is meant by *one-ninth* of a number or whole thing? *Two-ninths?* *Five-ninths?*

6. What is meant by *one-tenth* of anything? *Six-tenths?*

7. How many *sixths* make a whole thing? How many *sevenths?* *Eighths?* *Ninths?* *Tenths?*

LESSON CXX.

1. A ***Unit*** is one, or a single thing.

2. Numbers that express or represent *equal parts* of a unit are called ***Fractions;*** as, one-half ($\frac{1}{2}$); two-thirds ($\frac{2}{3}$), etc.

3. A fraction is expressed by two terms or numbers, and when written, one is placed below and the other above a short line; as, $\frac{1}{4}$, $\frac{2}{3}$, $\frac{3}{5}$, etc.

4. The number below the line is the ***Denominator.***

Thus, in the fraction $\frac{3}{4}$, 4 is the *denominator,* and shows that the unit is divided in *four* equal parts, named *fourths.*

5. The number above the line is the ***Numerator.***

Thus, in $\frac{3}{4}$, 3 is the *numerator,* and shows that 3 of the 4 equal parts *are taken,* or expressed, by the fraction.

6. The *numerator* and *denominator* of a fraction are called the ***Terms.***

Thus, 3 and 4 are the *terms* of the fraction $\frac{3}{4}$.

7. Read the following fractions, and name the *denominator* and the *numerator* in each:

$\frac{2}{3}$, $\frac{3}{5}$, $\frac{5}{6}$, $\frac{4}{7}$, $\frac{5}{8}$, $\frac{4}{5}$, $\frac{5}{9}$, $\frac{1}{8}$, $\frac{2}{7}$, $\frac{3}{10}$, $\frac{7}{8}$.

8. Write the following in figures:

Five-ninths.
Three-sevenths.
Two-fifths.
Four-sevenths.
Five-sixths.
Three-eighths.

Four-ninths.
Seven-ninths.
Seven-tenths.
Five-sevenths.
Eight-ninths.
Nine-tenths.

One-twelfth.
Five-elevenths.
Nine-fourteenths.
Eleven-twelfths.
Eight-fifteenths.
Seven-twentieths.

LESSON CXXI.

1. How do you find *one-half* of any number?

Ans. Divide the number by 2.

2. How do you find 1 third of any number? $\frac{1}{4}$? $\frac{1}{5}$? $\frac{1}{6}$? $\frac{1}{7}$? $\frac{1}{8}$? $\frac{1}{9}$? $\frac{1}{10}$? etc.

3. What is $\frac{1}{2}$ of 6? Of 8? Of 12? Of 18? Of 20?

4. What is $\frac{1}{3}$ of 9? Of 15? Of 21? Of 24? Of 27?

5. What is $\frac{1}{4}$ of 12? Of 16? Of 28? Of 32? Of 40?

6. What is $\frac{1}{5}$ of 20? Of 35? Of 45? Of 50? Of 60?

7. What is $\frac{1}{6}$ of 18? $\frac{1}{7}$ of 21? $\frac{1}{5}$ of 30? $\frac{1}{4}$ of 36?

8. What is $\frac{1}{7}$ of 28? $\frac{1}{6}$ of 54? $\frac{1}{8}$ of 48? $\frac{1}{7}$ of 63?

9. What is $\frac{1}{8}$ of 40? $\frac{1}{9}$ of 45? $\frac{1}{7}$ of 49? $\frac{1}{9}$ of 72? $\frac{1}{8}$ of 56?

10. What do you understand by $\frac{2}{5}$ of any number or thing? *Ans.* *Two* of the *five equal parts* into which the number or thing is divided.

11. What do you understand by $\frac{3}{5}$ of any number or thing? By $\frac{3}{4}$? By $\frac{1}{6}$? $\frac{5}{6}$? By $\frac{1}{7}$? $\frac{3}{7}$? $\frac{4}{7}$? By $\frac{1}{8}$? $\frac{3}{8}$? $\frac{5}{8}$? $\frac{7}{8}$?

12. What is meant by $\frac{1}{9}$ of any number or thing? By $\frac{2}{9}$? $\frac{4}{9}$? $\frac{5}{9}$? $\frac{7}{9}$? By $\frac{1}{10}$? $\frac{3}{10}$? $\frac{7}{10}$? $\frac{9}{10}$?

13. What is $\frac{2}{3}$ of 12?

SOLUTION.—*One*-third of 12 is 4; 2 thirds of 12 are 2 times 4, or 8. Hence $\frac{2}{3}$ of 12 are 8.

14. What is $\frac{3}{4}$ of 16? $\frac{2}{3}$ of 15? $\frac{3}{5}$ of 20? $\frac{4}{5}$ of 25?

15. What is $\frac{5}{6}$ of 18? $\frac{5}{6}$ of 30? $\frac{3}{7}$ of 21? $\frac{4}{7}$ of 28? $\frac{3}{8}$ of 32? $\frac{3}{4}$ of 36?

16. What is $\frac{2}{9}$ of 27? $\frac{4}{9}$ of 18? $\frac{5}{9}$ of 36? $\frac{1}{10}$ of 40? $\frac{7}{10}$ of 30? $\frac{3}{11}$ of 44?

LESSON CXXII.

1. How do you find how many *halves* there are in any whole number? *Ans.* Multiply the whole number by 2.

2. How do you find how many *thirds* there are in any number? How many *fourths?* *Fifths?* *Sixths?* *Sevenths?* *Eighths?* *Ninths?* *Tenths?* etc.

3. How many halves are there in 3 peaches?

Solution.—Since in 1 peach there are 2 *halves*, in 3 peaches there are 3 times 2 *halves*, or 6 *halves*. Hence, in 3 peaches are 6 *halves*.

4. How many *halves* are there in 4? In 8? In 9?

5. How many *thirds* are there in 5? In 7? In 8?

6. How many *fourths* are there in 7? *fifths* in 8? *sixths* in 6? *sevenths* in 9? *eighths* in 7? *ninths* in 5? *tenths* in 8?

7. How many *halves* in one and a half?

Solution.—In 1 are 2 *halves*, and 1 *half* added makes 3 *halves*. Hence, in 1 and 1 half there are 3 *halves*.

8. How many *halves* in 3 and 1 half? In 5 and 1 half?

9. How many *thirds* in 2 and 2 thirds?

Solution.—Since in 1 there are 3 thirds, in 2 there are 2 times 3 thirds, or 6 thirds, and 2 thirds added make 8 thirds. Hence, in 2 and 2 thirds there are 8 *thirds*.

10. How many *thirds* in 4 and 1 third? *fourths* in 3 and 1 fourth?

11. How many *fifths* in 2 and 3 fifths? *sixths* in 5 and 4 sixths? *sevenths* in 3 and 2 sevenths?

12. How many *fourths* in 6 and 3 fourths? In 7 and 1 fourth? In 8 and 3 fourths?

LESSON CXXIII.

1. When the numerator and denominator of a fraction are equal, the *value* of the fraction is equal to 1; as $\frac{3}{3}=1$; $\frac{4}{4}=1$; $\frac{6}{6}=1$, etc.

2. When the numerator is greater than the denominator, the *value* is greater than 1; as $\frac{4}{3}=1\frac{1}{3}$; $\frac{8}{4}=2$, etc.

3. A whole number and a fraction written together are called a ***Mixed Number;*** as $5\frac{3}{4}$, read 5 and 3 fourths.

4. Read the following *mixed numbers:*

$3\frac{5}{8}$; $9\frac{2}{3}$; $7\frac{5}{6}$; $10\frac{4}{5}$; $8\frac{7}{9}$; $12\frac{7}{10}$; $14\frac{7}{12}$; $5\frac{1}{9}$.

5. How many *fifths* are $4\frac{3}{5}$?

Solution,—Since in 1 there are 5 fifths, in 4 there are 4 times 5 fifths, or 20 fifths, and 3 fifths added make 23 fifths. Hence $4\frac{3}{5}$ are $\frac{23}{5}$.

6. How many *fourths* are $9\frac{1}{4}$? Are $7\frac{3}{4}$? Are $8\frac{2}{4}$?

7. How many *thirds* are $12\frac{2}{3}$? *Fifths* are $6\frac{4}{5}$? *Sixths* are $7\frac{5}{6}$? *Fourths* are $10\frac{3}{4}$?

8. Change $4\frac{5}{8}$ to *eighths;* $9\frac{3}{7}$ to *sevenths;* $8\frac{7}{10}$ to *tenths;* $5\frac{7}{9}$ to *ninths;* $4\frac{5}{12}$ to *twelfths.*

9. How many *ones* are $\frac{12}{4}$?

Solution.—Since 4 fourths equal 1, 12 fourths are as many 1's as 4 fourths are contained times in 12 fourths, or 3 times. Hence $\frac{12}{4}$ are 3 *ones* or 3. Or $\frac{12}{4}=12\div4=3$.

10. Find the value of $\frac{15}{3}$; of $\frac{18}{6}$; of $\frac{21}{7}$; of $\frac{28}{4}$; of $\frac{36}{9}$.

11. Change to a whole or a mixed number $\frac{30}{5}$; $\frac{27}{6}$; $\frac{36}{5}$; $\frac{42}{7}$; $\frac{50}{10}$; $\frac{45}{8}$; $\frac{37}{4}$; $\frac{60}{12}$.

12. What is the value of $\frac{44}{8}$? $\frac{56}{7}$? $\frac{72}{12}$? $\frac{60}{8}$? $\frac{57}{10}$? $\frac{70}{9}$?

13. Find the value of $\frac{75}{9}$; $\frac{66}{11}$; $\frac{84}{9}$; $\frac{96}{12}$; $\frac{100}{10}$.

LESSON CXXIV.

1. How many are 2 *fifths* and 3 *fifths?*

Ans. 5 *fifths,* or $\frac{5}{5}=1$.

2. Can you add 3 *apples* and 5 *figs?* Why not?

3. Can you add 3 *fourths* and 5 *sixths?* Why not?

4. Only fractions having the *same denominator* can be added.

5. How many are $\frac{7}{8}+\frac{3}{8}$? *Ans.* $\frac{10}{8}=1\frac{2}{8}$.

6. What is the sum of $\frac{5}{6}$ and $\frac{3}{6}$? of $\frac{7}{10}$ and $\frac{6}{10}$? Of $\frac{5}{9}$ and $\frac{7}{9}$? Of $\frac{9}{10}$ and $\frac{4}{10}$?

7. Add $\frac{5}{12}$ and $\frac{9}{12}$. $\frac{7}{11}$ and $\frac{8}{11}$. $\frac{4}{6}$ and $\frac{7}{6}$. $\frac{2}{6}$ and $\frac{5}{6}$.

8. How many are 7 *ninths* less 2 *ninths?*

Ans. 5 *ninths,* or $\frac{5}{9}$.

9. Can you take 6 *books* from 9 *slates?* Why not?

10. Can you subtract 6 *sevenths* from 9 *twelfths?* Why not?

11. Only fractions having the *same denominator* can be subtracted.

12. How many are $\frac{7}{9}-\frac{3}{9}$? $\frac{9}{10}-\frac{7}{10}$? $\frac{7}{12}-\frac{1}{12}$? $\frac{11}{14}-\frac{9}{14}$?

13. Subtract $\frac{2}{3}$ from $\frac{5}{3}$. $\frac{2}{11}$ from $\frac{9}{11}$. $\frac{4}{15}$ from $\frac{13}{15}$.

14. How many are $\frac{3}{7}+\frac{4}{7}+\frac{5}{7}+\frac{6}{7}$. *Ans.* $\frac{18}{7}=2\frac{4}{7}$.

15. How many 1's are $\frac{6}{9}+\frac{1}{9}+\frac{7}{9}+\frac{8}{9}+\frac{10}{9}$?

16. From $\frac{5}{8}+\frac{3}{8}+\frac{7}{8}$ take $\frac{2}{8}$. *Ans.* $\frac{13}{8}=1\frac{5}{8}$.

17. From $\frac{7}{12}+\frac{5}{12}+\frac{11}{12}$ subtract $\frac{8}{12}$.

18. John spent $\frac{3}{8}$ of his money and lost $\frac{2}{8}$ of it. What part of his money had he left?

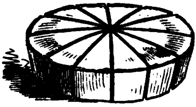
19. James paid $\frac{5}{6}$ of a dollar for a book, and $\frac{3}{6}$ of a dollar for a slate. How much did he pay for both? How much more for the book than for the slate?

LESSON CXXV.

1. If a cake is cut into 12 equal pieces, what part of the whole cake is each piece? *Ans. One-twelfth.*

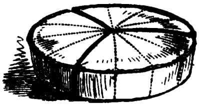
2. How many *twelfths* make a whole thing?

3. How do we find 1 *twelfth* of any number?



4. If a cake is divided into 3 equal parts, each part is called 1 *third.*

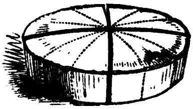
5. If each *third* of the cake is divided into 4 equal parts, into how many parts is the *whole cake* divided?



6. How many *twelfths* in 1 third? In 2 thirds? 3 thirds?

7. If a cake is cut into 4 equal parts, each part is called 1 *fourth.*

8. If each *fourth* of the cake is divided into 3 equal parts, into how many parts is the *whole cake* divided?



9. How many *twelfths* in 1 fourth? In 2 fourths? In 3 fourths? In 4 fourths?

10. If Edie has $\frac{1}{3}$ of a cake and Asa $\frac{1}{4}$ of it, what part have both? $\frac{1}{3}+\frac{1}{4}=$?

Solution.—Since $\frac{1}{3}$ is equal to $\frac{4}{12}$, and $\frac{1}{4}$ is equal to $\frac{3}{12}$, they have the *sum* of $\frac{4}{12}$ and $\frac{3}{12}$, or $\frac{7}{12}$.

11. How much more has Edie than Asa? $\frac{1}{3}-\frac{1}{4}=$?

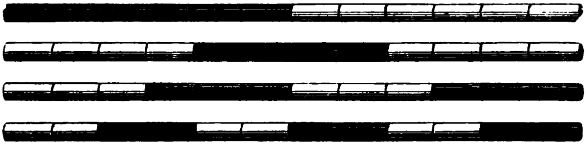
12. How many twelfths in $\frac{1}{2}$? In $\frac{1}{3}$? In $\frac{2}{3}$? In $\frac{1}{4}$? In $\frac{3}{4}$?

13. Which is greater $\frac{1}{3}$ or $\frac{1}{4}$? $\frac{1}{2}$ or $\frac{1}{3}$? $\frac{2}{3}$ or $\frac{3}{4}$?

14. If Mary has $\frac{1}{2}$, and Jennie $\frac{1}{4}$ of a melon, what part of the whole melon have both?

LESSON CXXVI.

1. Draw lines upon the slate or board of equal length, and divide them into 12 equal parts.



2. By a heavier mark these lines may be divided into *halves*, *thirds*, *fourths*, and *sixths*, respectively.

$1 = \frac{12}{12}$ $\quad \frac{1}{3} = \frac{4}{12}$ $\quad \frac{1}{6} = \frac{2}{12}$

$\frac{1}{2} = \frac{6}{12}$ $\quad \frac{1}{4} = \frac{3}{12}$ $\quad \frac{1}{12} = \frac{1}{12}$

3. Hence, it is plain that halves, thirds, fourths, sixths, and twelfths, may be added or subtracted when changed to parts of *equal size* or *magnitude.*

What is the sum of

4. $\frac{1}{2}$ and $\frac{2}{3}$?
5. $\frac{1}{3}$ and $\frac{1}{4}$?
6. $\frac{3}{4}$ and $\frac{1}{6}$?
7. $\frac{2}{3}$ and $\frac{3}{4}$?
8. $\frac{5}{6}$ and $\frac{3}{12}$?
9. $\frac{2}{6}$ and $\frac{3}{4}$?
10. $\frac{1}{6}$ and $\frac{1}{2}$?
11. $\frac{3}{12}$ and $\frac{3}{4}$?
12. $\frac{2}{3}$ and $\frac{1}{6}$?

What is the value of

13. $\frac{1}{2} - \frac{1}{3}$?
14. $\frac{1}{2} - \frac{1}{4}$?
15. $\frac{1}{3} - \frac{1}{6}$?
16. $\frac{3}{4} - \frac{2}{3}$?
17. $\frac{2}{3} - \frac{1}{6}$?
18. $\frac{5}{6} - \frac{2}{3}$?
19. $\frac{1}{4} - \frac{1}{6}$?
20. $\frac{7}{12} - \frac{3}{6}$?
21. $\frac{3}{4} - \frac{9}{12}$?

When fractions have different denominators, they must be changed to fractions of like value, having the same denominators, before they can be added or subtracted.

LESSON CXXVII.

1. 4 is $\frac{1}{2}$ of what number?

Solution.—Since 4 is 1 half of a number, 2 halves or the number are 2 times 4, or 8. Hence 4 is $\frac{1}{2}$ of 2 times 4, or 8.

2. 5 is $\frac{1}{3}$ of what number? $\frac{1}{4}$ of what number?
3. 7 is $\frac{1}{2}$ of what number? $\frac{1}{3}$ of what number?
4. 6 is $\frac{1}{4}$ of what number? $\frac{1}{5}$ of what number?
5. 4 is $\frac{1}{8}$ of what number? $\frac{1}{6}$ of what number?
6. 8 is $\frac{1}{5}$ of what number? $\frac{1}{4}$ of what number?
7. 3 is $\frac{1}{9}$ of what number? $\frac{1}{10}$ of what number?

8. If $\frac{1}{3}$ of a ton of coal cost 2 dollars, what will 1 ton cost?

9. George gave a beggar 6 cents, which was $\frac{1}{5}$ of all the money he had; how much money had he?

10. If $\frac{1}{4}$ of a pound of coffee cost 8 cents, what will $\frac{3}{4}$ of a pound cost?

Solution.—Since 1 fourth of a pound costs 8 cents, 3 fourths of a pound will cost 3 times 8 cents, or 24 cents.

11. If $\frac{1}{6}$ of a bushel of pears cost 9 cents, what will $\frac{5}{6}$ of a bushel cost?

12. In $\frac{1}{10}$ of a dollar are 10 cents; how many cents in $\frac{7}{10}$ of a dollar?

13. If a man walk 6 miles in $\frac{1}{4}$ of a day, how many miles can he walk in 1 day?

14. A pencil cost 8 cents, which was $\frac{1}{6}$ the cost of a book; what was the cost of the book?

15. If $\frac{1}{8}$ of a melon cost 7 cents, what will $\frac{5}{8}$ of it cost?

16. If $\frac{1}{6}$ of a barrel of flour is worth 2 dollars, what is $\frac{5}{6}$ of a barrel worth? What is a whole barrel worth?

LESSON CXXVIII.

1. If a barrel of sugar is worth 24 dollars, what is $\frac{1}{3}$ of it worth? 2 thirds? 1 fourth? 3 fourths?

2. If a boy earns 10 dollars in a week, and spends 2 fifths of it, what part is left? How many dollars?

3. When coal is 7 dollars a ton, what part of a ton will 1 dollar buy? 2 dollars? 3 dollars? 5 dollars?

4. At $\frac{2}{3}$ of a dollar a yard, what will 4 yards of cloth cost?

SOLUTION.—Since 1 yard costs $\frac{2}{3}$ of a dollar, 4 yards will cost 4 times $\frac{2}{3}$ or $\frac{8}{3}$ of a dollar, equal to $2\frac{2}{3}$ dollars.

5. At $\frac{2}{5}$ of a dollar a pound, what will 6 pounds of butter cost? 8 pounds? 9 pounds?

6. How many are 3 times $\frac{4}{5}$? 2 times $\frac{7}{8}$? 4 times $\frac{1}{9}$?

7. How many are 5 times $\frac{2}{7}$? 6 times $\frac{3}{4}$? 7 times $\frac{1}{8}$?

8. What is the difference between 3 fourths of 24 and 4 fifths of 30? 2 thirds of 27 and 1 sixth of 60?

9. If a ton of hay cost 21 dollars, what will 3 sevenths of a ton cost? 2 thirds of a ton?

10. A boy having 20 marbles, gave $\frac{1}{4}$ of them to one companion, and $\frac{1}{5}$ to another; how many had he left?

11. Jane paid 25 cents for a book, and $\frac{4}{5}$ as much for a slate; what did she pay for the slate?

12. Fanny is 14 years old, and her sister is $\frac{4}{7}$ as old: how old is her sister?

13. What will be the cost of 6 boxes of figs, at $\frac{3}{8}$ of a dollar a box?

14. If 1 pineapple cost $\frac{3}{5}$ of a dollar, what will 4 pineapples cost? What will 6 cost? 8? 9? 10?

LESSON CXXIX.

1. How many oranges in 6 thirds of an orange? In 7 thirds? In 9 thirds? In 10 thirds?

2. How many yards in $\frac{7}{5}$ of a yard? In $\frac{8}{5}$ of a yard? In $\frac{10}{5}$? In $\frac{12}{5}$? In $\frac{15}{5}$?

3. If 3 books cost 12 fifths of a dollar, what will 1 book cost?

Solution.—Since 3 books cost 12 fifths of a dollar, 1 book will cost 1 third of 12 fifths, or 4 fifths of a dollar.

4. If 3 pounds of coffee cost $\frac{9}{10}$ of a dollar, what will 1 pound cost? What will 5 pounds cost?

5. If 4 yards of ribbon cost $\frac{8}{9}$ of a dollar, what will 3 yards cost? 5 yards? 7 yards? 10 yards?

6. If a man walks $\frac{2}{3}$ of 6 miles in 1 hour, how far can he walk in 3 hours? How far in $\frac{1}{3}$ of an hour?

7. If 5 bushels of oats are worth $\frac{15}{4}$ of a dollar, what is 1 bushel worth? 3 bushels? 6 bushels? 10 bushels?

8. If 3 fourths of a bushel of cranberries are worth 3 dollars, what is $\frac{1}{2}$ of 6 bushels worth?

9. At 4 dollars a yard, what will $2\frac{1}{2}$ yards of cloth cost?

Solution.—Since 1 yard costs 4 dollars, $2\frac{1}{2}$ yards will cost $2\frac{1}{2}$ times 4 dollars; 2 times 4 dollars are 8 dollars, and $\frac{1}{2}$ of 4 dollars is 2 dollars, which added to 8 dollars make 10 dollars. Hence $2\frac{1}{2}$ yards will cost 10 dollars.

10. At 10 dollars a barrel, what will $\frac{1}{2}$ barrel of flour cost? What will $\frac{3}{5}$ of a barrel cost? $2\frac{1}{5}$ barrels?

11. At $\frac{3}{4}$ of 16 cents a pound, what will $\frac{1}{3}$ of a pound of sugar cost? $\frac{2}{3}$ of a pound? $1\frac{1}{3}$ pounds? $2\frac{1}{3}$ pounds?

MEASURES

LESSON CXXX.

1. In measuring a quantity, some *definite part* of it is taken as a ***Unit of Measure;*** as, a yard, a gallon, etc., by which all quantities of *that kind* are measured.

Hence, the *length* of a piece of cloth is ascertained by applying a *yard* measure; the *capacity* of a cask by the use of a *gallon* measure; the *weight* of a body by the *pound* weight, etc.

2. Measures may be classified into six kinds: Money or Value, Extension, Capacity, Weight, Time, Angles or Arcs.

MONEY.

3. ***Money*** is the measure of the *value* of things.

4. The legal money of this country is called ***United States Money.***

5. The ***Gold Dollar*** is the *unit* of United States Money.

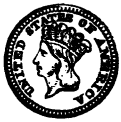


TABLE.

10 Mills (*m.*) = 1 Cent . . *ct.*
10 Cents = 1 Dime . . *d.*
10 Dimes = 1 Dollar . $.

$$\$1 = \begin{cases} 1000\ m. \\ 100\ ct. \\ 10\ d. \end{cases}$$

100 cents = 1 dollar; 75 cents = ¾ dollar; 50 cents = ½ dollar;
25 cents = ¼ dollar; 20 cents = ⅕ dollar; 12½ cents = ⅛ dollar.

The money of the Dominion of Canada is the same as that of the United States.

LESSON CXXXI.

1. How many mills in 1 cent? 3 cents? 5 cents?

2. How many cents are 30 mills? 50 mills? 60 mills?

3. How many dimes are 20 cents? 40 cents?

4. How many cents are 3 dimes? 4 dimes? 6 dimes?

5. How many dimes in 1 dollar? How many cents?

6. In half a dollar, how many dimes? Cents?

7. How many cents are 1 dollar? 2 dollars?

8. How many cents in $1\frac{1}{2}$ dollars? $2\frac{1}{4}$ dollars?

9. How many dollars in 200 cents? In 150? In 450?

10. The *sign* $ signifies ***dollar*** or ***dollars,*** and is placed before the number. Thus $3 means *three dollars;* $14 means 14 *dollars,* etc.

11. When *dollars* and *cents* are written together, they are separated by a dot (.); thus, $3.75 means 3 *dollars* and 75 *cents.*

12. When *cents* alone are expressed, the dot is placed after the sign $ and before the number; thus, $.50 is 50 cents; $.18 is 18 cents, etc. Or we may write the word *cents* or *cts.* after the number; thus, 50 *cents.*

13. *Mills* are written after cents; as, $4.375 is 4 dollars 37 cents 5 mills. 5 mills are ½ cent; $4.375=$4.37½.

14. Read the following:

$3.46
$4.50
$7.62
$.375
$6.08
$.427
$15.03
$10.10
$25.625
$1.12½
$.796
$.075

15. When the cents are less than 10, a cipher must be placed before them and after the dot; thus, *eight* cents is written 8 cents, or $.08; *six* cents, 6 cents, or $.06, etc.

LESSON CXXXII.

Exercises for the Slate and Board.

Write in figures

1. Forty-four dollars and twenty-six cents.

2. Eighteen dollars and seventy-five cents.

3. Thirty-five cents.

4. Eighty-seven cents.

5. Sixty cents.

6. Fifteen cents.

7. Nine cents.

8. Twenty cents.

9. Seventy-eight dollars sixty-two cents and five mills.

10. One hundred fourteen dollars and ninety cents.

11. In adding and subtracting, dollars should be placed under dollars, and cents under cents, so that the dots may be in the same column.

Add the following:

(*12.*)	(*13.*)	(*14.*)	(*15.*)
$3.50	$19.37	$6.29	$.875
12.48	.84	23.82	1.065
.75	5.09	1.10	12.63

Arrange in columns and add:

16. $11.36, $26.07, $9.16, $32.76, and $2.34.

17. $42.06, $10.30, $4.82, $.77, and $.93.

Subtract the following:

	(*18.*)	(*19.*)	(*20.*)	(*21.*)
From	$17.48	$73.26	$50.67	$120.80
Take	6.27	25.18	10.08	35.26

Find the value of

22. $57.10 — $12.40.

23. $104.47 — $73.92.

24. $100.375 — $40.095.

25. $416.08 — $208.67.

Find the sum

26. Of $32.50, $126.085, $9.408, $15.74, and $140.

27. Of $307.09, $50, $6.848, $100.10, and $450.

28. Of $76, $400, $5.125, $17.04, $.975, and $1.625.

29. A lady paid $45.40 for a dress, $15.37½ for a bonnet, $6 for a pair of gaiters, and $1.625 for a pair of gloves. What did she pay for all?

30. A farmer sold a cow for $36.50, a ton of hay for $14.25, and a tub of butter for $20.80. What did he receive for all?

31. Bought a hat for $4.75, a pair of shoes for $5.125, a pair of gloves for $.87½, and an umbrella for $2.75. What was the cost of the whole?

Find the difference between

32. $46.75 and $14.45.

33. $142.09 and $68.36.

34. $300.085 and $104.50.

35. $87.875 and $5.10.

36. $250 + $2.75 and $124.50.

37. $617.10 + $50.125 and $10.37½.

38. $908.46 and $325 + $5.25.

39. $1263.18 and $27.625 + $114.37½.

40. A man bought a horse for $150, and sold him for $137.50. What did he lose?

41. A grocer paid $28.75 for a barrel of sugar and sold it for $34. What did he gain?

42. Bought a sack of flour for $1.75, a pound of tea for $.90, and some sugar for $2.25. How much must I receive in change for a 5-dollar bill?

43. Paid $450 for a pair of horses, and sold one of them for $275.50. What did the other cost me?

Find the value

44. Of $93.67 − $12.80.
45. Of $118.19 − $9.87½.
46. Of $500 − $300.277.
47. Of $76.84½ − $40.12½.
48. Of $125 − $75 + $14.50.
49. Of $9.10 + $46.08 − $25.
50. Of $48 − $12.50 − $13.92.
51. Of $310 − $7.10 − $200.

52. A farmer sold a ton of hay for $12.50, and a cord of wood for $3.25. He received in payment a barrel of flour worth $7.60, and the remainder in money. How much money did he receive?

53. A grocer sold some tea for 80 cents, some butter for 2 dollars 30 cents, some eggs for 53 cents, and some sugar for one dollar and ten cents. How much change should he return for a five- dollar bill?

54. Mary went shopping and had 2 five-dollar bills; she bought a dress for 7 dollars 25 cents, trimmings for 2 dollars 37½ cents, some thread for 12½ cents, and some tape and needles for twenty cents. How much money had she left?

55. Henry gave one dollar and a half for a pair of skates, seventy-five cents for a cap, thirty-seven cents for a ball, half a dollar for a knife, two dollars and a quarter for a sled, and had one dollar left. How much money had he at first?

56. A man owed $427.50. He paid at one time $125.75, at another $100, and at another $50.25. What remained unpaid?

57. James had $5.48, Henry had $1.17 more than James, and George had $.75 less than James and Henry together. How much money had George; and how much had they all?

58. At $5.75 a ton, what will 5 tons of coal cost?

$5.75
5
$28.75

Analysis.—Since 1 ton costs $5.75, 5 tons will cost 5 times $5.75, or $28.75.

When the multiplicand contains *cents*, put the point (.) in the product *two* places from the *right*, and prefix the sign ($) to the whole.

	(59.)	*(60.)*	*(61.)*	*(62.)*
Multiply	$24.32	$42.09	76 cents.	$1.87
By	4	5	8	6
Product	$97.28	$210.45	$6.08	$11.22

In like manner,

63. Multiply $326 by 5; by 7; by 8; by 9; by 12.

64. Multiply $64.25 by 6; by 8; by 7; by 9.

65. Multiply $85.36 by 12; by 14; by 16; by 24.

66. Multiply $248.08 by 25; by 26; by 34; by 42.

Find the cost

67. Of 7 barrels of flour, at $8.60 a barrel.

68. Of 22 yards of cloth, at $4.35 a yard.

69. Of 40 bushels of wheat, at $1.75 a bushel.

70. Of 13 pounds of tea, at $1.10 a pound.

71. Of 27 pounds of butter, at 33 cents a pound.

72. Of 34 barrels of potatoes, at $3.75 a barrel.

73. At $4.15 a box, what are 18 boxes of oranges worth?

74. At $.875 a pound, what are 16 pounds of tea worth?

75. A farmer sold 6 cords of wood at $4.25 a cord, and 18 barrels of apples at $3.15 a barrel. What did he receive for both?

76. A merchant bought 25 yards of cloth at $3.50 a a yard, and sold it for $4.15 a yard. What was his gain?

77. If 6 pounds of tea cost $7.50, what costs 1 pound?

Divisor. Dividend.
6)$7.50
Quotient $1.25

ANALYSIS.—Since 6 pounds cost $7.50, 1 pound costs 1 *sixth* of $7.50, or $1.25.

When the dividend contains *cents*, put the point (.) in the quotient *two* places from the *right*, and prefix the sign ($) to the whole.

In like manner divide the following

(78.)	*(79.)*	*(80.)*	*(81.)*
8)$124.96	7)$6.58	5)$19.70	9)$376.02
$15.62	$.94	$3.94	$41.78

82. Divide $705.60 by 4; by 5; by 6; by 7.

Find
83. 1 *fifth* of $461.50.
84. 1 *eighth* of $17.36.
85. 1 *seventh* of $243.04.
86. 1 *sixth* of $500.10.

What is
87. $\frac{1}{8}$ of 67344 inches?
88. $\frac{1}{9}$ of 437868 feet?
99. $\frac{1}{5}$ of 134860 pounds?
90. $\frac{1}{7}$ of $1046.85?

91. Paid $57.75 for 8 sheep. What did each cost?

92. If 6 tons of coal cost $40.80, what costs 1 ton?

93. Paid $9.88 for 13 pounds of tea. What did 1 pound cost?

Find the value
94. Of $35.50 ÷ 4 × 12.
95. Of $4.35 ÷ 3 × 30.
96. Of $56.80 ÷ 8 × 19.
97. Of $90 × 18 ÷ 12.
98. Of $6.26 × 24 ÷ 8.
99. Of $12.75 × 14 ÷ 7.

100. If 5 boxes of lemons are worth $23.25, what are 14 boxes worth?

101. If 6 books cost $1.90, what will 27 books of the *same kind cost?*

LESSON CXXXIII.

1. ***English*** or ***Sterling Money*** is the money of Great Britain.

2. The ***Sovereign,*** or ***Pound Sterling,*** is the *unit* of English Money.

TABLE.

4 Farthings (*far.*) = 1 Penny . . . . *d.*
12 Pence = 1 Shilling . . . *s.*
20 Shillings = 1 Pound . . . . £.

The value of a *Sovereign* in United States Money is $4.866½.

2 Shillings (*s.*) = 1 Florin . . . . *fl.*
5 Shillings = 1 Crown . . . . *cr.*

3. ***French Money*** is the money of France.

4. The ***Silver Franc*** of the REPUBLIC is the *unit* of French Money.

The value of a *Franc* in United States Money is $.193.

TABLE.

10 Millimes (*m.*) = 1 Centime . . . *ct.*
10 Centimes = 1 Decime . . . *dc.*
10 Decimes = 1 Franc . . . . fr.

LESSON CXXXIV.

1. The ***Empire of Germany*** has adopted a new and uniform system of coinage.

2. The ***Reichsmark*** is the *unit* of this new German system of Coinage.

The value of a Reichsmark ("*Mark*") in U. S. Money is $.238.

A pound of gold .900 fine is divided into 139½ pieces, and the $\frac{1}{10}$ part of this gold coin is called a "Mark," and this is subdivided into 100 pennies (*Pfennige*).

1. How many farthings in 2 pence? In 4 pence? In 6 pence? In 10 pence? In 1 shilling?

2. How many pence in 2 shillings? In 3s.? In a florin? In a crown?

3. How many shillings in 3 florins? In 4 crowns?

4. How many shillings are equal to half a sovereign? How many florins? How many crowns?

5. What is the value of a sovereign in U. S. Money?

6. What part of a pound is half a sovereign? Are 5 florins? Are 2 crowns?

7. How many centimes in 1 franc? In 5 francs?

8. What part of a franc are 50 centimes? 25 centimes?

9. What is the value of a franc in U. S. Money?

10. Into how many parts is a mark divided? What are they called?

11. *What is the* value of a mark in U. S. Money?

LESSON CXXXV.

1. ***Extension*** has one or more of the dimensions, *length, breadth,* and *thickness.*

2. It may be a *line*, a *surface*, or a *solid.*

3. A ***Line*** has only one dimension—*length.*

4. ***Linear Measure,*** called also ***Long Measure,*** is used in measuring *lines*, or distances.

TABLE.

12	Inches (*in.*)	= 1 Foot	*ft.*	1 *Mi.* =	63360 *in.*
3	Feet	= 1 Yard	*yd.*		5280 *ft.*
5½	Yards, or 16½ Ft.	= 1 Rod	*rd.*		1760 *yd.*
320	Rods	= 1 Mile	*mi.*		320 *rd.*

5. In measuring *roads*, and *boundaries* of land,

7.92	Inches	= 1 Link	*l.*	1 *Mi.* =	63360 *in.*
25	Links	= 1 Rod	*rd.*		8000 *l.*
4	Rods	= 1 Chain	*ch.*		320 *rd.*
80	Chains	= 1 Mile	mi.		80 ch.

LESSON CXXXVI.

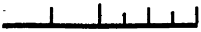
1. In measuring goods sold by the *yard,* the yard is divided into *halves, fourths, eighths,* and *sixteenths.*

2¼ Inches = 1 Sixteenth, $\frac{1}{16}$ *yd.*
2 Sixteenths (4½ in.) = 1 Eighth, ⅛ *yd.*
2 Eighths (9 in.) = 1 Quarter, ¼ *yd.*
4 Quarters = 1 Yard, 1 *yd.*

OTHER DENOMINATIONS.

4 Inches = 1 Hand, Used to measure height of horses.
6 Feet = 1 Fathom, " " depth at sea.
1.152⅔ Statute Miles = 1 Geog. Mi, " " distances "
3 Geographic Miles = 1 League.
69.16 Common Miles = 1 Degree.
360 Degrees = The Circumference of the Earth.

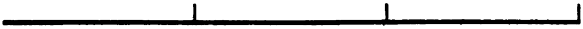
2. The *units* of linear measure are *lines.*

3. This *line*  is *one inch* long.

4. The inch is divided into *halves, fourths,* and *eighths.*

5. Make a line *twice* as long ; *three times* as long.

6. How many inches long is this line?



7. How many inches in a line 1 foot long? In 1 ft. 6 in.? In 2 ft.? In 2 ft. 8 in.?

8. How many inches in *one-half* foot? In *one-third?*

9. How many feet in 15 inches? *Ans.* 1 ft. and 3 in.

10. How many feet in 18 inches? In 36 inches?

11. How many inches in 2 feet? In 1 yard?

12. In 2 yards, how many quarters? Eighths?

LESSON CXXXVII.

1. ***Surface*** or ***Square Measure*** is used in measuring *surfaces;* as of land, boards, plastering, etc.

TABLE.

144 Square Inches (*sq. in.*) = 1 Square Foot . . *sq. ft.*
9 Square Feet = 1 Square Yard . . *sq. yd.*
30¼ Square Yards = 1 Sq. Rod or Perch. *sq. rd.; P.*
160 Square Rods = 1 Acre . . . . . *A.*
640 Acres = 1 Square Mile . . *sq. mi.*
36 Square Miles = 1 Township . . . *Tp.*

sq. mi.		*A.*		*sq. rd.*		*sq. yd.*		*sq. ft.*		*sq. in.*
1	=	640	=	102400	=	3097600	=	27878400	=	4014489600

2. In computing the *area* or *contents* of land,

625 Sq. Links (*sq. l.*) = 1 Pole . . *P.*
16 Poles = 1 Sq. Chain. *sq. ch.*
10 Square Chains = 1 Acre . . *A.*

$$1\ A. = \begin{cases} 100000\ l. \\ 160\ P. \\ 10\ sq.\ ch. \end{cases}$$

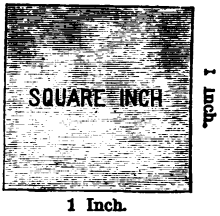
LESSON CXXXVIII.

1. A ***Surface*** has two dimensions—*length* and *breadth.*

2. The *units* of square measure are *squares.*

3. A ***Square*** is bounded by four equal sides.

This drawing is a *square inch*, each side of which is 1 inch long.

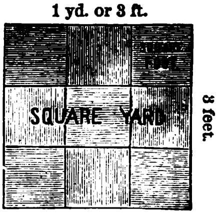


4. How many square inches in a strip of board 1 inch wide and 12 inches long? In 2 such strips? In 3? In 4? In 5? In 6? 7? 8? 9? 10? 11? 12?

5. A *square yard* is a square, each side of which is 1 yd., or 3 ft. long.

This drawing represents a *square yard* divided into *square* feet.

6. In 1 row there are 3 sq. ft., in 3 rows there are 3 times 3 sq. ft., or 9 square feet.



3 sq. ft. × 3 = 9 sq. ft.

7. How many square feet in the surface of a table 3 feet wide and 6 feet long?

8. How many square feet in the floor of a room 8 ft. wide and 10 ft. long?

9. How many square feet in a hall 6 ft. wide, 12 ft. long? How many square yards? How many yards of carpet 1 yd. wide will cover it?

10. How do we find the *surface* or contents of a square or of an oblong figure?

Ans. By multiplying together the *two dimensions,* or the *length* and *breadth.*

LESSON CXXXIX.

1. ***Cubic*** or ***Solid Measure*** is used in measuring *solids;* as timber, wood, stone, boxes of goods, etc.

TABLE.

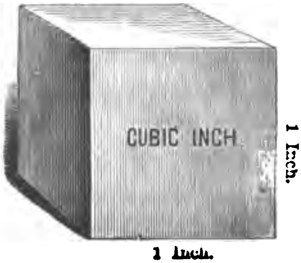
1728 Cubic In. (*cu. in.*)	=1 Cubic Ft., *cu. ft.*	1 *cu. yd.* =	46656 *cu. in.*
27 Cubic Feet	=1 Cubic Yd., *cu. yd.*		27 *cu. ft.*

2. A ***Solid*** has *three* dimensions—*length, breadth,* and *thickness.*

3. The *units* of cubic measure are *cubes.*

4. A ***Cube*** is a body bounded by six equal squares called *faces.*

5. The sides of the squares are called the *edges* of the cube.



This drawing represents a *cubic inch,* each edge of which is 1 inch long.

LESSON CXL.

1. ***Wood Measure*** is used to measure wood and rough stone.

TABLE.

16	Cubic Feet	= 1 Cord-Foot	*cd. ft.*
8 128	Cord-Feet, or Cubic Feet	= 1 Cord	*Cd.*
24¾	Cubic Feet	= 1 Perch of Stone, or of Masonry	*Pch.*

2. A pile of wood 8 feet long, 4 feet wide, and 4 feet high contains 1 *cord.*

3. One foot in length of such a pile, that is, 1 foot long, 4 feet wide, and 4 feet high, is called 1 *cord-foot.*

4. A *Perch* of stone or of masonry is 16½ feet long, 1½ feet wide, and 1 foot high, and contains 24¾ cubic feet.

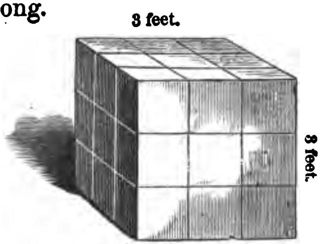
LESSON CXLI.

1. How many cubic feet in a piece of timber 1 foot square at the ends and 3 feet long? In 2 such pieces?

2. How many cubic feet in 4 such pieces? 5? 6?

3. How many cubic feet in 1 cubic yard? In 2 cu. yd.?

4. A *cubic yard* is a cube each *face* of which is 1 sq. yd., and each *edge* 1 yd., or 3 ft., long.



9 cu. ft. × 3 = 27 cu. ft.

This drawing represents a *cubic yard*, each face being a *square* yard, containing 9 sq. ft. If a piece, or section, 1 foot thick is cut from one side, it may be divided into 3 times 3 cu. ft., or 9 cu. ft. And since a cubic yard contains 3 such sections, there are 3 times 9 cu. ft., or 27 cu. ft., in a cubic yard.

5. How many cubic feet in a block of marble 1 ft. thick, 3 ft. wide, and 6 ft. long? 2 ft. wide, 2 ft. thick, and 4 ft. long?

6. How many inches in a cubic block whose edges are 3 inches long? Are 4 inches long?

7. How do we find the *solidity*, or contents, of a cube or of an oblong body?

Ans. By multiplying together the *three dimensions*, or the *length*, *breadth*, and *thickness*.

8. How many cubic feet in a pile of wood 8 ft. long, 4 ft. wide, and 4 ft. high? In a pile 6 ft. long, 5 ft. wide, and 3 feet high?

9. If a stove burn 1 cord-foot of wood in a week, in what time will it burn 1 cord? 2 cords? 3 cords?

LESSON CXLII.

1. ***Capacity*** signifies extent of *room* or *space.*

2. Measures of capacity are divided into two classes; Measures of *Liquids* and Measures of *Dry Substances.*

3. ***Liquid Measure*** is used in measuring *liquids;* as spirituous liquors, oil, molasses, milk, water, etc.

TABLE.

4	Gills (*gi.*)	= 1	Pint . . .	*pt.*	1 *hhd.* =	2016 *gi.*
2	Pints	= 1	Quart . .	*qt.*		504 *pt.*
4	Quarts	= 1	Gallon . .	*gal.*		252 *qt.*
31½	Gallons	= 1	Barrel .	*bbl.*		63 *gal.*
63	Gallons	= 1	Hogshead .	*hhd.*		2 *bbl.*

In some of the New England States the barrel is estimated at 32 gallons; in some States 31½ gallons, and in others from 28 to 32.

4. In prescribing and compounding *liquid* medicines,

60	Minims (♏)	= 1	Fluidrachm .	*ƒʒ.*	*Cong.* 1 =	♏ 61440.
8	Fluidrachms	= 1	Fluidounce .	*ƒ℥.*		*ƒʒ* 1024.
16	Fluidounces	= 1	Pint . . .	*O.*		*ƒ℥* 128.
8	Pints	= 1	Gallon . . .	*Cong.*		*O.* 8.

LESSON CXLIII.

1. ***Dry Measure*** is used in measuring articles *not liquid;* as grain, fruit, salt, roots, etc.

TABLE.

2 Pints (*pt.*) = 1 Quart . . . *qt.*
8 Quarts = 1 Peck . . . *pk.*
4 Pecks = 1 Bushel . . *bu.*

$$1\ Bu. = \left\{\begin{array}{r} 64\ pt. \\ 32\ qt. \\ 4\ pk. \end{array}\right.$$

2. The weight of the *bushel* of certain grains, seeds, and vegetables has been fixed in many of the States by law, and though *not uniform* in this respect, the following are the prevailing standards:

Wheat . .	60 lb.	Beans	60 lb.	Wheat Bran . .	20 lb.
Rye . . .	56 "	Buckwheat . .	42 "	Rye Meal . . .	56 "
Corn . . .	56 "	Flax Seed . . .	56 "	Corn Meal . . .	50 "
Barley . .	48 "	Hemp Seed . .	44 "	Corn in Ear . .	68 "
Oats . . .	32 "	Potatoes . . .	60 "	Clover Seed . .	60 "
Peas . . .	60 "	Onions	57 "	Timothy Seed .	45 "

LESSON CXLIV.

1. How many gills in 1 pt? In 2 pints? In 1 quart?

2. How many pints in 2 quarts? In 3 qt.? In 1 gal.?

3. How many pints in ½ gal.? In ¾ gal.? In 1½ gal.?

4. How many gallons in 12 quarts? In 24 qt.? In 36?

5. How many quarts in 10 pints? 18 pt.? In 20 pt.?

6. How many pints in 4 qt. 1 pt.? In 6 qt. 1 pt.?

7. In 1 pint, how many fluid-ounces? In 2 pints?

8. How many quarts in 1 peck? In 3 pk.?

9. How many pints in 1 pk.? In 1 pk. 1 qt.?

10. How many quarts in ½ bushel? In ¾ bushel?

11. How many pecks in 2 bushels? In 1½ bu.? In 2¼ bu.?

12. How many half-pecks in a bushel? In 2 bu.?

13. In 48 quarts, how many pecks? How many bu.?

14. In 64 pints, how many quarts? pecks? bushels?

15. When milk is worth 10 cents a quart, what is a pint worth? What is 1 gallon worth?

16. At 5 cents a pint, what will a half-peck of chestnuts cost? 3 qt. 1 pt.?

17. How many pounds in a half-bushel of wheat? In ½ bu. of corn? In ½ bu. of oats?

18. How many pounds in a peck of oats? Of barley?

19. At 4 cents a pint, what will 2 quarts of milk cost?

20. If a cup hold 3 pints, how many times can you fill it from a 3 gallon jar full of water?

21. If a bushel of plums cost 2 dollars, what is the cost of a peck? Of a quart?

22. How many quart boxes will 3 pk. 6 qt. of berries fill? How many half-gallon measures?

LESSON CXLV.

1. ***Troy Weight*** is used in weighing gold, silver, and jewels, and in philosophical experiments.

TABLE.

24 Grains (*gr.*)	=	1 Pennyweight	. *pwt.*	1 lb. =	5760 *gr.*
20 Pennyweights	=	1 Ounce	*oz.*		240 *pwt.*
12 Ounces	=	1 Pound	*lb.*		12 *oz.*

2. ***Apothecaries' Weight*** is used by apothecaries and physicians in compounding *dry* medicines.

20 Grains (*gr.* xx)	=	1 Scruple	. *sc.*, or ℈.	℔ 1 =	*gr.* 5760.
3 Scruples (℈iij)	=	1 Dram	. dr., or ʒ.		℈ 288.
8 Drams (ʒ viij)	=	1 Ounce	. *oz.*, or ℥.		ʒ 96.
12 Ounces (℥ xij)	=	1 Pound	. *lb.*, or ℔.		℥ 12.

Medicines are bought and sold in quantities by Avoirdupois weight.

The pound, ounce and grain are the same as those of Troy weight, the ounce being *differently divided.*

LESSON CXLVI.

1. ***Avoirdupois Weight*** is used for all the ordinary purposes of weighing.

TABLE.

16 Ounces (*oz.*)	= 1 Pound . . . . *lb.*	1 *T.* =	32000 *oz.*
100 Pounds	= 1 Hundredweight *cwt.*		2000 *lb.*
20 cwt., or 2000 lb.	= 1 Ton . . . . . *T.*		20 *cwt.*

The *ounce* is often divided into *halves*, *quarters*, etc.

2. The following denominations are also used:

100 Pounds of Grain or Flour	make	1 Cental.
100 Pounds of Dry Fish	"	1 Quintal.
100 Pounds of Nails	"	1 Cask or Keg.
196 Pounds of Flour	"	1 Barrel.
200 Pounds of Pork or Beef	"	1 Barrel.

3. COMPARATIVE TABLE OF WEIGHTS.

	Troy.	Avoirdupois.	Apothecaries'.
1 Pound	= 5760 Grains,	= 7000 Grains,	= 5760 Grains.
1 Ounce	= 480 "	= 437.5 "	= 480 "
	175 Pounds,	= 144 Pounds,	= 175 Pounds.

The *Standard Bushel* of the United States contains 2150.42 cubic inches, and is a cylindrical measure 18½ inches in diameter and 8 inches deep.

The *English Quarter* contains 8 Imp. bushels, or 8¼ U. S. bushels.

Grain is shipped from New York by the *Quarter* of 480 lb. (8 U. S. bu.), or by the *ton* of 33⅓ U. S. bushels.

It is sufficiently accurate in practice to call 5 *stricken* measures equal to 4 *heaped* measures.

The *Standard Liquid Gallon* of the United States contains 231 cubic inches, and is equal to about 8⅓ lb. Avoir. of pure water.

The half-peck, or *dry gallon*, contains 268.8 cubic inches.

Six dry gallons are equal to nearly *seven liquid* gallons.

LESSON CXLVII.

1. How many ounces in 2 pounds of tea? In 8 lb.?

2. How many pennyweights in two ounces? Ounces in 60 pwt.? Pounds in 48 ounces?

3. How many drams in 1 ounce? In 3? In 4? In 6?

4. How many ounces in ½ a pound? In ¼? In ¾?

5. How many pounds in a hundredweight? In 3 cwt.?

6. How many pounds in 1½ cwt.? In 2½ cwt.? In ½ cwt.?

7. How many hundred weight in 1 ton? In 2 tons? In ½ ton? In ¼? In ¾?

8. How many ounces in 1 pound of gold chain? In 1 pound of medicine? In 1 pound of coffee?

9. At 6 cents a pound, how many pounds of rice can you buy for 30 cents? For 42 cents?

10. In 2 cwt. 40 lb., how many pounds? In 5 cwt. 50 lb.?

11. What part of a hundredweight are 50 pounds? Are 25 pounds? Are 75 pounds?

12. How many hundredweight in ¼ of a ton of hay? In ½ of a ton? In ⅕ of a ton?

13. How many pounds in ½ barrel of pork? In ½ barrel of beef? In ½ barrel of flour?

14. At 9 cents a pound, what will a keg of nails cost?

15. At 2 cents a pound, what will a cental of flour cost?

16. What will 5 centals of wheat cost, at 4 dollars a cental? 6 centals, at 3 dollars a cental?

17. How many barrels are 600 pounds of pork?

18. How many centals are 500 pounds of flour?

19. How many kegs are 800 pounds of nails?

20. How many barrels are 1000 pounds of beef?

LESSON CXLVIII.

1. ***Time*** is the measure of a portion of duration.

TABLE.

60 Seconds (*sec.*)	=	1 Minute . .	*min.*
60 Minutes	=	1 Hour . . .	*hr.*
24 Hours	=	1 Day . . .	*da.*
7 Days	=	1 Week . . .	*wk.*
365 Days, or 12 Calendar Mo.	=	1 Common Year.	*yr.*
366 Days	=	1 Leap Year. .	*yr.*

COMMON YEAR.

$$1\ Yr. = \begin{cases} 525600\ min. \\ 8760\ hr. \\ 12\ mo. \\ 365\ da. \end{cases}$$

2. ***Circular*** or ***Angular Measure*** is used in measuring angles, arcs of circles, etc.

TABLE.

60 Seconds (″)	=	1 Minute . . .	′
60 Minutes	=	1 Degree . . .	°
30 Degrees	=	1 Sign	*S.*
12 Signs, or 360°	=	1 Circle . . .	*C.*

$$1\ C. = \begin{cases} 1296000''. \\ 21600'. \\ 360^\circ. \\ 12\ S. \end{cases}$$

A ***Semi-Circumference*** is *one-half* of a circumference, or 180°.

A ***Quadrant*** is *one-fourth* of a circumference, or 90°.

A ***Sign*** is *one-twelfth* of a circumference, or 30°.

A ***Degree*** (1°) is *one-thirtieth* of a Sign.

LESSON CXLIX.

1. Certain classes of articles for market purposes are *counted.*

Table.

12 Units = 1 Dozen . . . *doz.*
12 Dozen = 1 Gross . . . *gro.*
12 Gross = 1 Great Gross . *G. gro.*
20 Units = 1 Score . . . *sc.*

$$1\ G.\ gro. = \begin{cases} 1728\ units. \\ 144\ doz. \\ 12\ gro. \end{cases}$$

Two things of a kind are often called a *pair*, and *six* things a *set;* as a *pair* of horses, a *set* of chairs, etc.

2. The *paper* trade use the following:

24 Sheets = 1 Quire . . . *qr.*
20 Quires = 1 Ream . . . *rm.*
2 Reams = 1 Bundle . . . *bun.*
5 Bundles = 1 Bale . . . . *B.*

$$1\ B. = \begin{cases} 4800\ \text{Sheets.} \\ 200\ \text{Quires.} \\ 10\ \text{Reams.} \\ 5\ \text{Bundles.} \end{cases}$$

Paper is bought at *wholesale* by the bale, bundle, and ream; and at *retail* by the ream, quire, and sheet.

LESSON CL.

Name the *months* in the year, and the number of *days* in each.

	MONTHS.		NO. DAYS.		MONTHS.		NO. DAYS.
1.	January,	*Jan.,*	*31*	7.	July,	*July,*	*31*
2.	February,	*Feb.,*	*28* or *29*	8.	August,	*Aug.,*	*31*
3.	March,	*Mar.,*	*31*	9.	September,	*Sept.,*	*30*
4.	April,	*Apr.,*	*30*	10.	October,	*Oct.,*	*31*
5.	May,	*May,*	*31*	11.	November,	*Nov.,*	*30*
6.	June,	*June,*	*30*	12.	December,	*Dec.,*	*31*

BOOKS.

A sheet of paper folded in 2 leaves is called *a folio.*
A sheet of paper folded in 4 leaves is called *a quarto,* or *4to.*
A sheet of paper folded in 8 leaves is called *an octavo,* or *8vo.*
A sheet of paper folded in 12 leaves is called *a duodecimo,* or *12mo.*
A sheet of paper folded in 16 leaves is called a *16mo.*
A sheet of paper folded in 18 leaves is called an *18mo.*
A sheet of paper folded in 24 leaves is called a *24mo.*
A sheet of paper folded in 32 leaves is called a *32mo.*

MONEY MENTIONED IN THE BIBLE.

A Talent (gold)	value	in U. S.	Money,	$26592.809
A Talent (silver)	"	"	"	1662.024
A Manch or Mina	"	"	"	27.699
A Pound (Mina)	"	"	"	15.715
A Shekel (gold)	"	"	"	8.861
A Shekel (silver)	"	"	"	0.547
A Golden Daric or Dram	"	"	"	5.312
A Piece of Silver (Stater)	"	"	"	0.628
Tribute Money (Didrachm)	"	"	"	0.314
A Bekah	"	"	"	0.263
A Piece of Silver (Drachm)	"	"	"	0.157
A Penny (Denarius)	"	"	"	0.152
A Farthing (Assarium)	"	"	"	0.008
A Mite	"	"	"	0.002

LESSON CLI.

1. How many days in 1 week? In 3 wk.? In 4 wk.?

2. How many hours in ¼ of a day? In ½? In ¾?

3. How many minutes in ⅕ of an hour? In ⅓? In ½?

4. How many months in ⅙ of a year? In ¼? In ¾?

5. How many days has a leap year?

6. How often does leap year occur?

7. Name the months of the year.

8. Name the months that have 30 da. each. 31 da.

9. What month is it now? How many days has it?

10. How many days from April 20th to May 10th.

11. How many days from Aug. 1st to Sept. 5th.

12. How many buttons in 1 gross? In ½ of a gross?

13. How many pens in ¼ of a gross? How many dozen?

14. Find the cost of ½ of a gross of eggs, at 20 cents a dozen.

15. How many make 1 pair? 2½ pairs? 5 pairs?

16. How many in 1 set? In ½ a set? In 2½ set?

17. How many quires of paper in ½ of a ream?

18. How many sheets of paper in 2 quires? In ⅓ of a quire?

19. Find the cost of ½ of a ream of paper, at 20 cents a quire.

20. How many score in 40? In 60? In 100?

21. How many in ½ of a score? In 1½ score? 2½ score?

22. Which is greater, ¼ of a ream or 100 sheets of paper?

23. What is the difference between ⅓ of a dozen, and 6 dozen eggs?

24. Which is greater, 6 sets of chairs, or 2⅓ dozen chairs?

LESSON CLII.

1. What is the difference in a foot long and a foot square? In a square foot and a cubic foot?

2. How many inches long is a block in the form of a cubic foot? How many wide?

3. What is measured by the fathom? By the hand?

4. How many feet deep is a river that measures 5 fathoms?

5. How many feet high is a horse that measures 15 hands?

6. How many square feet in a blackboard 27 ft. long and 3 ft. wide? How many square yards?

7. Which is greater, 10 square inches or a 10 inch square?

8. Which is greater, 6 cubic inches or a 6 inch cube?

9. How many squares, each equal to a square foot, are equal to a surface 12 ft. long and 8 ft. wide?

10. How many cubes, each equal to a cubic foot, are equal to a block 5 ft. long, 4 ft. wide, and 3 ft. thick?

11. How is stone measured? How is wood measured?

12. Give the dimensions of a cord-foot.

13. How many pints of water will fill a vessel that holds 1½ gallons?

14. How many times can a peck measure be filled from 2½ bushels?

15. Which is heavier, a bushel of wheat or a bushel of corn? A bushel of barley or a bushel of oats?

16. Which is heavier, a barrel of flour or a barrel of *pork? A keg of* nails or a cental of grain?

LESSON CLI.

ROMAN NOTATION.

1. This method employs seven capital letters to represent numbers.

LETTERS.	I,	V,	X,	L,	C,	D,	M.
VALUES.	1,	5,	10,	50,	100,	500,	1000.

2. Repeating a letter repeats its value.

Thus, XX represents 20; CCC, 300; DD, 1000.

3. When a letter is placed *after* one of greater value, its value is to be *added* to that of the greater.

Thus, VI represents 6; XV, 15; LXX, 70; DC, 600.

4. When a letter is placed *before* one of greater value, its value is *taken from* that of the greater.

Thus, IV represents 4; IX, 9; XL, 40

TABLE OF ROMAN NOTATION.

I	=	1	XIV	=	14	LX	=	60
II	=	2	XV	=	15	LXX	=	70
III	=	3	XVI	=	16	LXXX	=	80
IV	=	4	XVII	=	17	XC	=	90
V	=	5	XVIII	=	18	C	=	100
VI	=	6	XIX	=	19	CXIX	=	119
VII	=	7	XX	=	20	CC	=	200
VIII	=	8	XXI	=	21	CCX	=	210
IX	=	9	XXV	=	25	D	=	500
X	=	10	XXX	=	30	DCV	=	605
XI	=	11	XXXIV	=	34	M	=	1000
XII	=	12	XL	=	40	MDL	=	1550
XIII	=	13	L	=	50	MDCLXVI	=	1666

MDCCCLXXV = 1875, one thousand eight hundred and seventy-five.

MULTIPLICATION TABLES.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

1	13	14	15	16	17	18	19	20	21	22	23	24
2	26	28	30	32	34	36	38	40	42	44	46	48
3	39	42	45	48	51	54	57	60	63	66	69	72
4	52	56	60	64	68	72	76	80	84	88	92	96
5	65	70	75	80	85	90	95	100	105	110	115	120
6	78	84	90	96	102	108	114	120	126	132	138	144
7	91	98	105	112	119	126	133	140	147	154	161	168
8	104	112	120	128	136	144	152	160	168	176	184	192
9	117	126	135	144	153	162	171	180	189	198	207	216
10	130	140	150	160	170	180	190	200	210	220	230	240
11	143	154	165	176	187	198	209	220	231	242	253	264
12	*156*	*168*	*180*	192	204	216	228	240	252	264	276	288

50
5

40
5
4
450

15
35
65

24

26

10

5

2

70